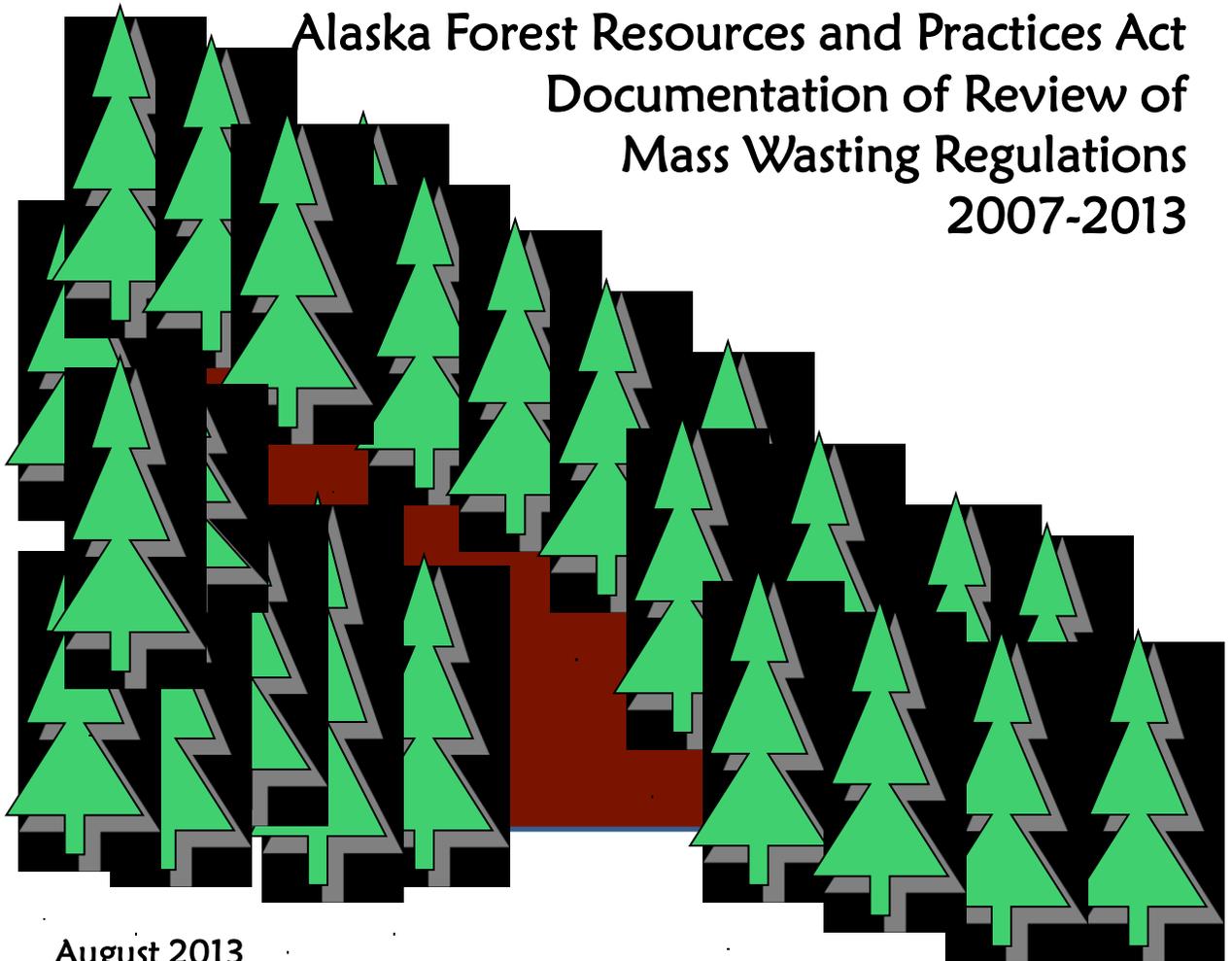


Alaska Forest Resources and Practices Act Documentation of Review of Mass Wasting Regulations 2007-2013



August 2013



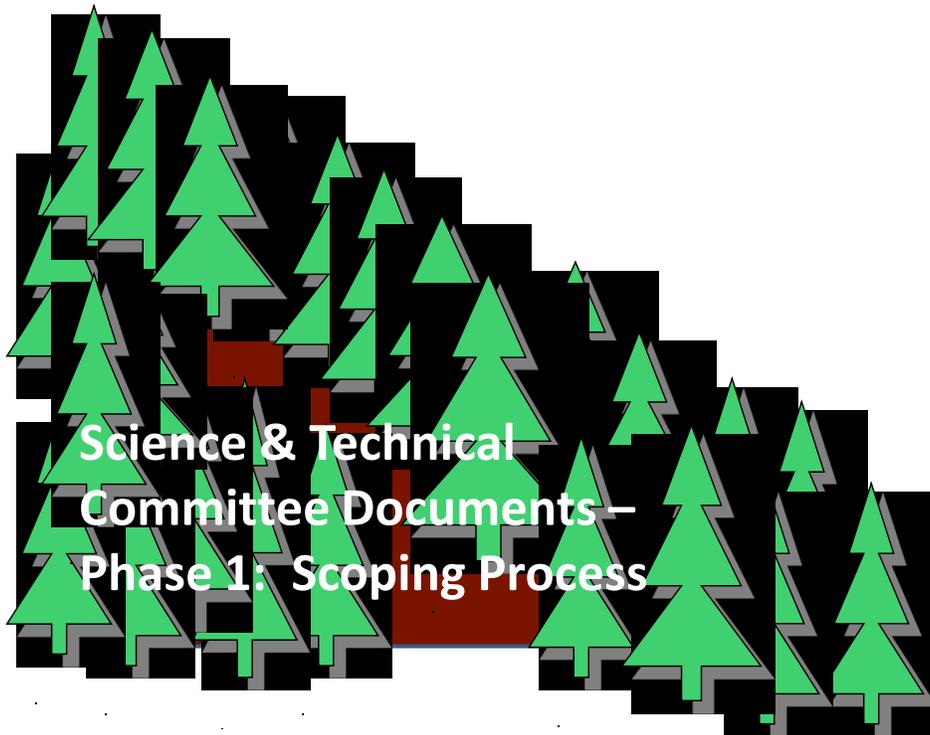
Produced by the Dept. of Natural Resources, Division of Forestry, 550 W. 7th Avenue,
Anchorage, AK 99501 in collaboration with the Dept. of Environmental
Conservation Division of Water and the Dept. of Fish and Game Division of Habitat

**Alaska Forest Resources & Practices Act
Landslides and Forest Practices Review 2007-2011
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This package documents the review and revision process for the Forest Resources & Practices Act (FRPA) standards to prevent and minimize adverse impacts from landslides from October 2007-July 2013. It covers the work of the Board of Forestry, Science & Technical Committee (S&TC), and Implementation Group. It also includes regulatory changes that implemented the recommendations from this process.

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Landslide S&TC Members – Scoping Process

Expertise	Name	Contact info	E-mail	Phone
DNR-DOF	Marty Freeman	DNR Division of Forestry 550 W. 7 th Avenue, Suite 1450 Anchorage, AK 99501	Marty.freeman@alaska.gov	276-3749
DNR-DOF	Pat Palkovic Greg Staunton	DNR Division of Forestry 2417 Tongass Avenue Suite 213 Ketchikan, Alaska 99901	pat.palkovic@alaska.gov greg.staunton@alaska.gov	225-3070 225-3070
DEC-WQ	Kevin Hanley	DEC Division of Water 410 Willoughby Ste 303, PO Box 111800 Juneau, AK 99801-1800	Kevin.hanley@alaska.gov	465-5364
ADF&G-Habitat	Kyle Moselle	ADF&G Habitat Division PO Box 240020 Douglas, AK 99824-0020	Kyle.moselle@alaska.gov	465-4287
ADOT	Ralph Swedell	SE Regional Office 6860 Glacier Highway, MS-2506 Juneau, AK 996811-2506	Ralph.swedell@alaska.gov	465-4449
Hydrology	Adelaide Johnson	USFS PNW Forest Sciences Lab 2770 Sherwood Lane, Suite 2A Juneau, AK 99801-8545	Ajohnson03@fs.fed.us	586-8811 x257
Geology	Jim Baichtal	USFS-TNF Ketchikan SO P.O. Box 19001 Thorne Bay, AK 99911	jbaichtal@fs.fed.us	828-3248
Soil Science	Dennis Landwehr	USFS-TNF Ketchikan SO 648 Mission Street Ketchikan, AK 99901-6591	dlandwehr@fs.fed.us	228-6309

**Forest Resources & Practices Act
Landslide Science & Technical Committee (S&TC)
Scoping Consensus Points
July 27, 2009**

C1am. The scoping model and associated maps are tools for assessing the general scope of landslide hazards and public safety risks associated with commercial timber harvesting subject to FRPA. They do not replace the need for site-specific analysis and design of timber sales and access roads.

C2am. The location of public safety hazards will change over time as patterns of public use, public road access, land ownership, timber harvesting and other land uses change.

C3am. The scoping model is a first approximation based on available data of the geographic extent of potential landslide hazards in areas open to commercial timber harvest operations subject to FRPA where there is public use, in the portion of coastal Alaska from Cordova south.

For this model, public use is defined as

- roads open to the public and monitored by DOT,
- US Forest Service roads in Objective Maintenance Level categories 3, 4, and 5, and
- where known, other roads open to the public and maintained by local entities.

The accuracy of the model is limited by the detail of available Digital Elevation Models (DEMs) and the ability to model potential runout zones at a regional scale.

The model also incorporates site-specific modifications based on the local knowledge and best professional judgment of the Science and Technical Committee, and the Committee's review of available digital orthophotos.

C4 Definitions.

Landslide: The moderately rapid to rapid downslope movement of soil and rock materials that may or may not be water saturated.

Mass Wasting: A general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another. Also Mass Movement.

Unstable or Slide Prone Slope: A slope where landslide scar initiation zone(s) exist, or where jack-strawed trees, frequently dissected slopes, a high density of Class 4 and zero order basins, or soil creep are common. Consider especially areas where these features occur on slopes

greater than 50 percent.

High risk of slope failure: see known or unstable slide-prone slope.

Fill material prone to mass wasting: organic debris, a log chunk with a volume in excess of five cubic feet, organic soil, fine-textured mineral soils. A fine textured soil has a texture class of sandy-clay, silty-clay, or clay. Organic soil has more than 20 percent organic carbon. (Soil Survey Manual 1983).

MINUTES OF SCIENCE & TECHNICAL COMMITTEE MEETINGS PHASE 1 - SCOPING PROCESS

Forest Resources & Practices Act Landslide Science & Technical Committee Minutes -- Meeting #1 - February 10, 2009 Juneau

Attendees: Greg Staunton, Pat Palkovic, Jim Baichtal, Kevin Hanley, Kyle Moselle, Dennis Landwehr, Di Johnson, Ralph Swedell, Marty Freeman

Background. Freeman reviewed the history leading to the Science & Technical Committee (S&TC) process. The Board of Forestry discussed public safety issues associated with landslides following a request from the Mitkof Highway Homeowners Association. The Division of Forestry (DOF) recommended an S&TC to address issues with existing Forest Resources & Practices Act (FRPA) definitions and determine the sufficiency of existing best management practices (BMPs) for addressing public safety issues. The Board concurred. The S&TC process will follow the model used previously to review and update FRPA riparian management standards. In this process, the S&TC is charged with synthesizing the best scientific and technical expertise, not conducting an economic or political assessment.

We will conduct the S&TC process in two phases:

- Phase 1: Assess the extent of landslide risks associated with forest operations that could be hazards to public safety.
- Phase 2: Compile the best available scientific and technical knowledge about landslides and mass wasting related to commercial forest operations in Alaska, and review the forest practices mass wasting standards, and if needed, recommend changes to Board of Forestry.

In response to a question, Freeman estimated that it would take 2-3 meetings total to complete phase 1; and another 4-6 meetings over 12 months to complete phase 2.

Marty also reviewed key characteristics of the FRPA. The Act

- is designed to protect fish habitat and water quality, and ensure prompt reforestation of forestland while providing for a healthy timber industry.
- Governs how timber harvesting, reforestation, and timber access occur on state, private, and municipal land. Forest management standards on federal land must also meet or exceed the standards for state land established by the Act.
- Recognizes a different balance on public and private land. For example, wider buffer widths apply to public land. The Act's development acknowledged that restrictions on private land can result in takings of private property rights that require compensation.
- Originated in 1978 with a major revision in 1990 to address riparian management, enhance notification procedures for timber operations, and establish enforcement procedures. Additional changes to the stream classification system and riparian management standards for coastal forests (Region I, see map) were adopted in 1999, Region II in 2003, Region III in 2006.
- Applies to
 - Commercial timber operations on forestland, including harvesting, roading, site preparation, thinning, and slash treatment operations on forestland.
 - All commercial harvest operations that encompass or border surface waters or a riparian area, regardless of their size.
 - Other commercial harvest operations in Region I that are larger than 10 acres.
- Key provisions

- Require that landowners notify the state before beginning commercial timber operations; notifications are subject to interagency review, and inspections may be required.
 - Set standards for forest management along waterbodies, including buffers.
 - Allow harvest of valuable individual trees within buffers when it can be done without harming fish habitat or water quality. Harvest within buffers requires agency approval.
 - Set standards to prevent erosion into waterbodies.
 - Require reforestation on all forest ownerships except where the land will be converted to another use, or where the harvest area is significantly composed of dead or dying trees
 - Establish enforcement authority through directives, stop work orders, notifications of violations, and fines.
- FRPA Regulations establish mandatory BMPs that cover road construction and maintenance, timber harvesting, and reforestation. The focus on preventing adverse impacts to fish habitat and water quality from timber operations.

Swedell noted that it is hard to define hazard conditions because they vary greatly from site to site. Department of Transportation work is project-oriented. The question is how to stability or prevent slides at a specific point. You can't predict where they will occur. You could establish requirements for site planning.

Hanley and Landwehr commented that the S&TC can provide a coarse screen. Hanley added that for the US Forest Service (USFS) the Mass Movement Index provides a coarse map, then areas of concern are examined site by site. They have the luxury of being able to require soil scientist reviews.

Swedell noted that Juneau has a great hazard map, but that it would be hard to provide that level of information region-wide.

Johnson said that we should look at initiation and deposition zones. These zones vary depending on the standing trees. Landwehr noted that the Mass Movement Index does not do a great job of identifying deposition zones.

Risk assessment map review

DOF developed a first draft of landslide public safety risk assessment maps. The maps identify areas along public roads within ½-mile downslope of slopes $\geq 67\%$ in forested areas where harvesting is not prohibited.

Johnson commented that the distance a landslide travels is variable, depending on whether the type of slide. A landslide connected with a dam failure in a stream course can travel farther than a half-mile. Identifying an initiation zone as $\geq 67\%$ is OK based on average initiation zone angles, but could be lower. Swedell added that slope stability isn't the whole story.

Baichtal asked about the resolution of the DEM used, and suggested there might be options with more detail. Staunton noted that the current model shows macro-sites rather than micro-sites.

The S&TC reviewed each of the draft maps and had the following comments. Freeman also noted recommended site-specific edits on the maps.

Map 1 (Cordova): DOF will check the ownership in the mapped hazard areas to determine it's "harvestability", i.e., is it in a form of private ownership where commercial timber harvest would be feasible?

Map 2 (Haines State Forest): Hanley stated that the forested area adjacent to the mapped hazard area along the Porcupine Road is too steep for harvesting – it’s not operable. Johnson said that slide effects could extend beyond the mapped area. DOF will review the Haines State Forest Management Plan and site-specific information to determine the “harvestability” of the slopes above the mapped hazard area.

Map 3 (Hoonah-Spasski): Baichtal noted that there are karst features and spring-fed streams in this area. Landwehr commented that traffic levels are minimal on the USFS roads in this area; tour buses don’t go into the Game Creek area. Swedell said that DOT is studying a Tenakee-Hoonah road connection, but it is not likely to happen soon. The odds of landslide-human impacts in this area are minimal.

Baichtal and Moselle noted that Huna Totem Corporation is operating quadrunner tours for cruise ship passengers on a logging road that runs from the landfill to Pt. Sophia along the east side of the peninsula during the cruise season. The road is not shown on the hazard map and should be added. Moselle suggested that the state’s forest road condition survey might have additional information on access. Moselle noted that there aren’t any known landslides in the hazard areas on this map. Most of the local use is for subsistence hunting and berry-picking.

Johnson said that the slope in documented slide areas could be calculated and extrapolated to other areas to identify hazard zones.

Map 4 (Freshwater Bay-Tenakee): Moselle noted that the known slides match the mapped hazard areas in this area. Swedell stated that there is little public use in the areas on this map and the odds of a slide affecting people are small.

Palkovic commented that the assessment should consider the time of year. In response to a question, Landwehr said that most slides occur in the fall, October - December. There are also some spring slides during snowmelt and rain-on-snow events in February – March, particularly on south-facing slopes. Slide initiation requires precipitation.

Baichtal reported that Petersburg, Wrangell, Ketchikan, and Juneau were mapped for perched marine silts and clays and geologic hazards in the 1970s. Baichtal has copies, but the information has not been digitized.

Map 5 (Sitka): DOF will check the status of the mapped hazard areas on state land – they may not be within the state timber base.

Johnson commented that the hazard area along the Mitkof Highway may extend further north than shown on the draft map. She will review the Douglas Swanston report on the area for his assessment of landslide hazards. Palkovic said that she had looked at slopes in that area when reviewing the Detailed Plan of Operations, and found that they were less steep. Moselle suggested reviewing DOT’s airphotos of this area.

Map 6 (Mitkof): DOF will check the status of the mapped hazard areas on state land – some may not be within the state timber base.

Landwehr reported that there have been slides on roads south of the Map 6 area, but the roads receive little use. Staunton said that timber sales in that southern area are limited by the state area plan to a maximum size of 10 acres. Baichtal commented that there is public use of the Banana Point area associated with jetboat operations.

Map 7: Moselle asked whether landslides along the transmission lines along Eastern Passage would constitute a public safety hazard (see notes on subsequent discussion, p. 6)

DOF will check the land status of the mapped hazard areas on private land to determine “harvestability”.

Johnson will review the Shoemaker Bay area for hazard potential. She reiterated that a half-mile runout area is inadequate. Landwehr responded that few slides extend more than a half-mile.

Map 8: Baichtal stated that the private land areas around Red Bay and California bay are actually smaller than shown on the map. The El Capitan road system is isolated and not driven. The Red Lake road gets seasonal public use, but is closed by snow from December – May.

Map 9: There are many known landslides, but little public use. Landwehr commented that the Sweetwater Lake – Luck Lake road does get slides. It used to get more traffic, but public use will decrease when work on the main road is complete. Work will continue for a few more years. He added that the Little Lake – Luck Lake road has some hazard potential. Slides have occurred, but to date they haven’t reached the road. He recommended that the public use data layer be reviewed because the road gets some use and has known slides, but doesn’t show a mapped hazard area. The detailed map area should extend further east – there is heavy recreational use in this area. Baichtal added that the bedrock is decomposing granite which increases the risk of slides.

Landwehr suggested considering the USFS road maintenance categories to help determine the level of public use. Level 4-5 roads might capture the routes with the highest public use.

Map 10 (Hollis): Landwehr reported that public use and potential hazards extends along the roads south of the detailed map boundary; the map should be extended to cover this area.

Map 11: Baichtal reported that a recent slide initiated in a clearcut area above Klawock Lake and extended across the road. Landwehr recommended reviewing the mapped hazard area along Klawock Inlet – the maps shows steep areas above the public road, but these are cliffs, and may not be harvestable. He also suggested that the runout zone for the mapped hazard area SE of Klawock Lake may be too shallow for a hazard to exist along the road. In contrast, the mapped hazard area along Port. St. Nicholas is “an accident waiting to happen,” and there are houses in this area.

Landwehr said that there is also some risk of landslides along the road to Black Bear Lake. Road use is restricted, and primarily associated with maintenance of the hydroelectric plant at the lake. Staunton asked whether risks to infrastructure are public safety risks, or is the issue just risk to human life and residences? Moselle replied that infrastructure associated with energy supply is also a public safety issue. (See also notes on this issue on p. 6)

Baichtal noted that there are also transmission lines and a power plant in this area.

Map 12 (Hydaburg): Palkovic said that she would expect hazard areas in pockets along the road north of Hydaburg. The slopes may be <67%, but they are steep.

Baichtal asked how much public use occurs on Native Corporation roads. Palkovic reported that there is little use. Road use is restricted even to shareholders, but Hydaburg residents do use the Deer Bay area. The Deer Bay road hasn’t been open recently, and is growing up in alder, but operations are restarting. There have been slides. Palkovic will look into road use in this area.

Staunton asked about whether there is a public safety risk in areas where the landowner restricts public use of the roads. I.e., could a landowner choose to restrict public use of a road to mitigate public safety hazards rather than restricting the location of harvest operations?

Map 13 (Revilla-Gravina): Freeman noted that the Bostwick Lake road doesn't show on the map and should be added. Staunton noted that the Bostwick Lake road is planned for closure following state harvest operations. There are some areas of slide hazard along the road route. Moselle commented that the USFS is currently assessing a proposed Central Gravina sale and analyzing options for access via the Vallendar and Bostwick Lake roads rather than the road system from the southern end of Gravina Island.

Palkovic noted that the White River road is gated, but the Native corporation (Cape Fox) runs tours on that road system. Staunton added that there is seasonal tour use to Mahoney Lake within the gated section. There is interest in acquiring a public road route through this area to Carroll Inlet. He said that the road near Mahoney Lake gets little public use, and the use is seasonal and access is restricted.

Landwehr stated that the mapped hazard areas along the road from Ward Cove to Lake Harriet Hunt and Talbot lake should be extended. Slide hazards are more extensive than the mapped area.

DOF will review area the area along Clover Passage for harvestability. There have been slides along the road.

The question about the public safety role of transmission lines was also raised here. Local communities have diesel backups for the event of power failure.

Model upgrades. Johnson reiterated that ½-mile distance is not a good measure to use for slide runout areas and deposition zones can have much gentler slopes than 67%. The model should show all the land downslope from mapped initiation areas as part of the potential hazard zone. Hanley concurred that the hazard area includes both the road and residential areas below the initiation zone.

Landwehr suggested analyzing the data on known, measured landslides for runout distance and its relationship to the angle of initiation. Data is available for roughly 200 slides in southern Southeast. He doesn't have data for northern Southeast where the mountains are bigger. Johnson reported that the longest measured slide in the dataset was 2,649 meters, for a slide in a stream course. The mean deposition slope angle for slides in old growth was about 25%, in young growth it was 27%, and in a clearcut it was 21%.

He also recommending running the model for a 50% slope angle to identify initiation areas – it would likely pick up 90% of the known slides.

Baichtal and Staunton also recommended identifying digital elevation models (DEMs) with higher resolution. A coarse DEM can hide many small slope features.

Palkovic recommended adding roads in residential areas – the current road layer is mostly forest roads or main public thoroughfares.

Swedell said that the general guidelines (BMPs) seem reasonable – perhaps the Mitkof Homeowners situation could be addressed specifically without developing new regional guidelines. Hanley noted that the proposed harvest above the Mitkof Highway planned for selective harvesting by helicopter, which is what the agencies would have recommended for that site. There didn't appear to be problems with the harvest as proposed. Freeman noted that both the Mental Health Trust and the Mitkof Highway Homeowners Association hired consultants to assess the site, but that the assessments differed significantly. Freeman will provide copies of the two reports to the S&TC. Moselle noted that the Oregon system relies on site-specific assessments by consultants, but now there are controversies over whether consultants can be hired who will reach a pre-determined conclusion for their clients. The professional board is now wrangling with this issue.

Infrastructure risks. Hanley said that considering impacts to infrastructure such as transmission lines is outside the original intent of the Board. Staunton commented that they are a major public resource, similar to roads in economic value. Moselle noted that the letter from the Mitkof Highway Homeowners raises questions about impacts from “clear-cut logging and road building above homes, highways, utility corridors, or a community.” Palkovic agreed with Hanley that the focus is on public safety. To affect transmission lines a slide would have to hit a pole, and the risk of that is small. Hanley noted that when power from the Snettisham dam was interrupted, Juneau could go on diesel power, and the damage was repaired in days. Some areas may not have the luxury of diesel backup. Damage to houses and life is different – it cannot be repaired quickly if at all. Staunton suggested that much of the landslide hazard issue would be better addressed by local governments if they existed throughout the area.

Marty will review this issue with the Board to clarify their charge to the S&TC.

Seasonal use and risk. Freeman noted that during the review of the draft maps, there were sites where significant public use occurs only in the summer, when slides are rare. How does that affect considerations of risk?

Landwehr said that the conditions have to be considered case-by-case. Incorporating the USFS road maintenance categories and the road condition survey information on active and closed roads may show seasonal use areas, because some roads are only maintained seasonally.

Palkovic reported that the Oregon forest practices system for landslide includes seasonal use consideration in assigning risk categories. Structures that are used only during seasons with low slide occurrence are assigned to a lower risk category, with different BMPs.

Hanley noted that the Access and Travel Management (ATM) plans prepared by the USFS determine whether national forest roads will be closed or maintained.

Moselle noted that snowmachine use may be high in winter seasons on unmaintained roads.

Definitions. Freeman reported that the Division of Forest identified three terms used in the regulations that are not defined:

- “unstable or slide-prone slope”,
- “slope that has a high risk of slope failure”
- “fill material prone to mass wasting”.

The Board recommended working with the S&TC to define these terms and provide guidance on determining where these conditions exist. Freeman asked the S&TC to start thinking about definitions. Landwehr and Johnson agreed to try to develop suggested definitions.

References. Freeman shared copies of existing references and noted that previous S&TC processes developed an annotated bibliography of key information relevant to Alaska. She asked S&TC members to start compiling references that they have and forwarding them to her to add to the existing list.

Hanley asked whether the bibliography of FRPA-related literature compiled by Bob Ott included landslide and mass wasting references. Freeman replied that it focused on riparian management literature, but she will check.

Consensus points:

<p>CI. The scoping model and associated maps are tools for assessing the general scope of landslide hazards and public safety risks associated with forest operations. They do not replace the need for site-specific</p>
--

analysis and design of timber sales and access roads.

C2. The location of public safety risks will change over time as patterns of public use, public road access, and timber harvesting change.

To do lists

All:

- Send annotated citations for relevant references to Marty.

Marty:

- Update draft risk assessment maps
 - Add a category for lands within ½-mile of 50% slopes. Data should be color-coded to show areas associated with 50-66% slopes separately from $\geq 67\%$ slopes
 - Show hazard areas as the land area within ½-mile downslope (polygon) rather than as linear feature along road.
 - Map 9: Extend detailed map to east along road system (east of Ratz Harbor)
 - Map 10: Extend detailed map to south along road system (south of Hollis)
 - Map 13: Extend mapped hazard along roads between Ward Cove and George Inlet
 - Drop hazard areas at Herring Bay (map 13)
 - Drop hazard area at El Capitan (map 8)
 - Add road/trail north of Hoonah (map 3)
 - Drop all map 4 hazard areas – roads are closed or little used.
 - Drop hazard area at SE end of Klawock Lake (map 11)
- Provide copies of the Mitkof Highway risk reports to S&TC
- Review prior FRPA bibliographies for slope stability and landslide references

Greg/Pat:

- Review all mapped hazard areas on state land for “harvestability” -- are they in the state timber base and operable (e.g., along Porcupine Road, map 2)
- Review all mapped hazard areas on non-Native private land for “harvestability” – are they in ownerships where harvesting is feasible, or subdivisions or other conditions that would preclude commercial timber harvest? (e.g., along Clover Passage and Mud Bay, map 13)
- Review harvestable areas along Klawock Inlet for hazard potential (map 11). Which corporation(s) are the landowners in the mapped hazard areas on map 11?
- Provide additional road coverage to Hans from road condition surveys, including Bostwick Road.
- Review Deer Bay road use and potential for hazards north of Hydaburg (map 12)
- Identify best road data source for state/private land, e.g., Road Condition Survey maps with active/inactive/closed status.
- Review options for best DEM model with Joel Nudelman.

Jim:

- Review options for more detailed DEM model
- Provide corrections to private land ownership on map 8 (El Cap)
- Review hazard potential in mapped hazard area at SE end of Klawock Lake (map 11)

Di and Dennis:

- Provide information on road maintenance categories
- Clarify extent of public use on roads on map 9.
- Assess the runout length of measured landslides and the relation to the initiation angle.

- Review Swanston report on Mitkof Highway for information on extent of hazard area.
- Review extent of hazard area along Shoemaker Bay (map 7)
- Provide suggestions on definitions for BMP terms:
 - “unstable or slide-prone slope”
 - “slope that has a high risk of slope failure”
 - “fill material prone to mass wasting”

Ralph:

- Provide information on other data layers for public roads other than forest roads, e.g., residential access

Next meeting: April 1, 2009



**Forest Resources & Practices Act
Landslide Science & Technical Committee (S&TC)
Minutes -- Meeting #2 - April 1, 2009 Juneau**

Attendees: Greg Staunton, Pat Palkovic, Jim Baichtal, Kevin Hanley, Kyle Moselle, Dennis Landwehr, Adelaide (Di) Johnson, Marty Freeman. Ralph Swedell was absent.

Agenda. No changes

February 10 Minutes. Minor changes were made to consensus point C1, as follows.

C1. The scoping model and associated maps are tools for assessing the general scope of landslide hazards and public safety risks associated with forest operations. They do not replace the need for site-specific analysis and design of timber sales and access roads.

[Note – edits were also made to Consensus Point C2 during subsequent discussions. See amended version on page 5.]

Public and Board input. Freeman handed out an excerpt from the draft minutes of the March 18-19 Board of Forestry meeting covering the briefing on the S&TC work to date, and Board discussion. In general, the Board was pleased with the progress made on scoping. The Board also clarified that the intent is to address issues of public safety risks to people rather than to infrastructure such as utility lines or roads.

Freeman also handed out a copy of a March 23, 2009 letter from Ed Wood of the Mitkof Highway Homeowners Association and attachments. The attachments include

- an affidavit from Robert Peterson about the location of Taain Creek,
- the 2006 Detailed Plan of Operations (DPO) for a timber harvest on Mental Health Trust land above the Mitkof Highway,
- a transmittal memo from the Division of Forestry to the Habitat Division accompanying the DPO
- a memo from the Department of Environmental Conservation to the Division of Forestry with comments on the DPO

- a letter from the California Board for Geologists and Geophysicists issuing a citation and fine to Craig Erdman
- Douglas Swanston's critique of the slope stability assessment by Craig Erdman
- Excerpts from the US Geological Survey Geologic Map of Southeastern Alaska Dept of Natural Resources
- Photos and a Geographic Information System (GIS) analysis of the 2004 Boulder Point landslide
- A map of land ownership and proposed timber harvest units along the Mitkof Highway.

Palkovic said that the statement attributed to her in footnote 21 of the letter is misleading. She clarified that landowners and operators have to comply with all relevant laws, and with forest practices requirements in the agency review comments on the FRPA Detailed Plan of Operations. However, the agencies' do not have any existing authority over public safety issues under FRPA.

Freeman also reported that she received a call from a representative of Shaan-Seet asking that the S&TC include an assessment of the Craig and Port St. Nicholas area in the scoping process.

Scoping map update. Freeman reported that a second version of the landslide hazard maps has been completed for most of the study area. Revised maps for the Cordova, Haines, Hoonah, and Sitka areas are still in progress. Freeman summarized the changes to the draft scoping maps made following the recommendations from the first S&TC meeting. Hans Buchholdt is the GIS specialist for the Division of Forestry who is doing this work.

Major changes:

- Incorporating a 20-meter resolution digital elevation model (DEM). This DEM has better control than the prior USGS version.
- Adding a second slope category to cover 50-66% slopes in the potential initiation zone
- Showing the hazard area as a polygon downslope of potential initiation zones. The hazard area continues downslope until the ground levels and turns up, the flow path hits a 90-degree angle, or the flowpath hits water. Hazard polygons also stop at the boundary of a land-use category not open to harvesting because they are low public use areas.
- Road coverage was changed to include all roads monitored for public traffic by ADOT&PF, and US Forest Service (USFS) roads in Objective Maintenance Levels 3, 4, and 5 – these are roads maintained in a condition drivable by cars. (See handout for a description of maintenance levels.)
- Incorporating site-specific changes recommended by the S&TC at the February 10 meeting.

Discussion of runout zones. Landwehr and Johnson provided data (see handouts) on field measurements of landslides.

Landwehr's data are based on 162 slides, of which 108 were associated with timber harvest and road construction prior, and 54 were storm event slides. The average initiation angle for all slides was 70%, but initiation angles ranged from 22 to 170%. Storm event slides averaged 469 feet long, about 21% longer than slides from roads, rock pits, and harvest areas (ave. = 369 feet). Only three slides exceeded 2,000 feet, and one of these was more than a half-mile long. Landslides caused by road construction generally initiated on gentler slopes than slides associated with timber harvesting. Landwehr reported that there is no direct correlation between the initiation angle and either the acreage or length of the slide.

He also analyzed initiation angles from 115 landslides on POW. This group of slides did not include 60 landslides related to initial road construction. A 50% and steeper initiation angle would include 93% of the 115 landslides. The 67% and steeper initiation angles would include 66% of the slides and the 72% and steeper initiation angle would include 49% of the landslides. Landwehr noted that because we do not harvest a lot of timber on slopes over 72% and even less on steeper slopes, the upper end of the data set

will always be lacking. Most productive timber growth – and therefore harvesting -- occurs between 30% and 90% gradients, so slides associated with timber harvest also occur primarily in that slope range.

Johnson described Johnson et al. (2000)¹ data compiled from a random sample of 45 landslides which include a mix of slides in old-growth, second-growth, and clearcuts. All the slides were associated with storm events. Initiation angles ranged from 44-96%, with a mean of 63%. More than half of the slides started on slopes $\leq 62\%$. She emphasized that the S&TC shouldn't just look at slopes greater than 62% for determination of landslide hazard areas. She recommended looking at gradients of 45% and up – that would include $\geq 95\%$ of slides.

Four of the 45 slides (9%) traveled more than a half-mile. They ranged from 0.02 to 1.01 miles long. Johnson said that runout length is dictated by slope and junction angles of channels the slide travels into more than distance alone. She brought a copy of a 1990 paper by Lee Benda and Terrance Cundy². Their model uses a 6% gradient for deposition slopes. Johnson et al., (2000) found that deposition slopes ranged from 4% to 33%, with a mean of 17%. Landslides in old-growth typically deposit on steeper slopes – they back up behind standing trees, downed trees and debris. Runout length of debris flows depends on whether a slide enters a creek, especially a 3rd order or larger channel – in these conditions, slides travel farther.

Landwehr noted that there are differences between the slides in his report and Johnson's. His study included slides associated with recent harvests and road construction – not all were from storm events. Johnson's study included a mix of cover types, but all were during a storm event. Some slides were included in both analyses. Slides in recent harvest areas are smaller on average than those in second-growth or old-growth. For the harvest area slides, 90% initiated on slopes $> 52\%$. Storm-event slides are typically bigger. Slides from road construction are generally smaller and are not a public safety hazard because they occur at a known point in time (during construction). Johnson noted that slides that start in old-growth areas may have longer runouts if they travel downslope into a clearcut, as the deposition slope of a landslide in a clearcut is generally lower.

These two analyses did not separate slides that were channelized vs. non-channel flow. All of the channel flow slides are in HC (high-gradient contained) channels, usually in TLMP Class 3 or some Class 4 channels. Class 4 channels won't increase flow much. Class 3 streams are larger – ≤ 5 feet wide and incised 15 feet or more.³

¹ Johnson, A.C., Swanston, D., and McGee, K., Landslide initiation, runout and deposition within clearcuts and old-growth forests of Alaska, *Journal of the American Water Association*, 36(1): 17-30.

² Benda, L.E., and T. W. Cundy. 1990. Predicting deposition of debris flows in mountain channels. *Canadian Geotechnical Journal*. Volume 27, Number 4. pp 409-417.

³ Class III and IV streams are defined in TLMP as follows.

Class III: Perennial and intermittent streams with no fish populations but which have sufficient flow, or transport sufficient sediment and debris, to have an immediate influence on downstream water quality or fish habitat capability. For streams less than 30% gradient, special care is needed to determine if resident fish are present. A stream segment is designated Class III if the following conditions are met **for the majority of its length:** Bankfull stream width greater than 1.5 meters (5 feet) **and** channel incision (or entrenchment) greater than 5 meters (15 feet). Streams that do not meet both the width and incision criteria may be classified as Class III streams based on a professional interpretation of stream characteristics for the stream segment being assessed. The following characteristics **could** indicate a Class III stream:

- a. Steep side-slopes containing mobile fine sediments, sand deposits, or deep soils that can provide an abundant source area for sedimentation.
- b. Very steep gradient channels (greater than 35 percent slope).
- c. Recently transported bedload or woody debris wedges (especially if deposited outside high water mark).
- d. High water indicators (scour lines, drift lines, etc.) that greatly exceed observed wetted stream width.
- e. Large sediment deposits stored amongst debris that could be readily transported if debris shifts.

Johnson disagreed with Landwehr's comment on the affect of stream channels on stream flow --she said that the effect of the channel on flow has more to do with the angle at which a slide enters a channel and the slope of the channel then the size of the channel. Slides tend to stop when the angles of entry that is close to perpendicular to the channel. The typical angle of entry may tend to be lower for higher class (Class 1, 2, or 3) streams than for Class 4 streams. Johnson also stated that landslides may flow into channels, block them, and create temporary dams that upon catastrophic failure initiate a process called "landslide-dam-break floods". These events can travel down gradients much lower than debris flows. These events have occurred in southeast Alaska.

Johnson also noted that Benda and Cundy's data (1990) was from the Oregon Coast Range, which doesn't have the same glacial history as Alaska. Glaciers typically leave U-shaped valleys in which the slope diminishes in the lower part of the valley, so that slides often deposit before reaching the channel. In V-shaped valleys created by rivers, more slide debris reaches the channel. Although V-shaped valleys are not as common in SE Alaska as in Oregon, they are present. Baichtal noted that the bedrock in the Oregon Coast Range also has bedding planes which create initiation zones and slippage.

Johnson commented that 87% of the slides from the Johnson et al. (2000) study initiated in till.

Landwehr observed that his data is from Prince of Wales Island which has smaller mountains than the central or northern Tongass, and slide lengths could be longer there.

Johnson commented that the second version of the hazard model on the maps reviewed today shows more of the risk areas identified by the Swanston report on Mitkof as hazard zones, primarily because hazard areas on slopes <62% were used. She also noted that approximately 20 areas of potential landslide runoff that should be included in the hazard category, are still missing due to a problem in the model. [Note: DOF is researching the modeling issue, and looking for ways to fix the glitch.]

Baichtal said that the landslide risk on Mitkof Island has more to do with glacial history than bedrock. There is a newer geology map for Mitkof than the one attached to the Mitkof Homeowners Association letter. Similar bedrock geology does not necessarily mean that there is a similar landslide hazard – slide risk is affected by surficial glacial deposits.

Scoping map review.

Baichtal said that given the resolution of the DEM this is a good approximation of slide hazard zones – good job. Johnson said that Buchholdt had asked questions in a well thought-out manner to create the model. She also said that adding the 50-66% slope category covers 90-95% or more of the potential slide areas. The revised model is more accurate in terms of impacts to roads and people.

Baichtal had access to the 2006 Census Bureau orthophotos of southeast Alaska. These provide a low altitude, high resolution, seamless, digital orthophoto coverage of most areas outside the main towns. The S&TC used this coverage during the meeting to review site-specific areas where members had questions on the revised maps and either confirm, modify, or drop mapped hazard areas.

Class IV: Other intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capacity to directly influence downstream water quality or fish habitat capability. Class IV streams **do not** meet the criterion used to define Class I, II, or III streams. Class IV streams must have bankfull width of at least 0.3 meter (1 foot) over the majority of the stream segment. For perennial streams, with average channel gradients less than 30 percent, special care is needed to determine if resident fish are present (resident fish presence dictates a Class II designation).

Site-specific comments on version 2 of the scoping maps are compiled in the attached chart.

Moselle said that “Alaska ShoreZone,” which is a video archive of the coastline developed by NOAA and is available on-line, may also show slopes adjacent to the shore in some areas.

<http://mapping.fakr.noaa.gov/Website/ShoreZone/viewer.htm>

Palkovic noted that areas that have recently been harvested won't be harvested again in the near term, so risk of slides associated with new harvesting or roading would be low in those areas.

The group discussed the model and endorsed a revision of Consensus Point 2, and a new Consensus Point 3 as follows.

C2am. The location of public safety hazards will change over time as patterns of public use, public road access, land ownership, timber harvesting and other land uses change.

C3. The scoping model is a first approximation, based on available data, of the geographic extent of potential landslide hazards in areas open to forest operations where there is public use in the portion of coastal Alaska from Cordova south.

For this model, public use is defined as

- roads open to the public and monitored by DOT,
- US Forest Service roads in Objective Maintenance Level categories 3, 4, and 5, and
- where known, **other** roads open to the public and maintained by local entities.

The accuracy of the model is limited by the detail of available Digital Elevation Models (DEMs) and the ability to model potential runout zones at a regional scale.

The model also incorporates site-specific modifications based on the local knowledge and best professional judgment of the Science and Technical Committee, and the Committee's review of available digital orthophotos.

Johnson noted that alluvial fans below initiation zones should be included in the hazard area. Alluvial fans, associated with floods, debris floods, and debris flows are often sites of residential developments, transportation and utility corridors, as well as high-value habitat for fish and high-productivity growing sites for forests⁴. It appears that at least one fan in the Mitkof Highway area isn't included in the hazard zone even though upslope areas are. Alluvial Fan (AF) stream types are mapped for national forest land. Hanley said the stream classification covers some non-federal land as well. Landwehr said streams that don't cross any national forest land may not be classified.

Freeman will check with Buccholdt on the reason the fan doesn't show up on the Mitkof hazard map. If it isn't a model glitch that can be fixed, then we will look at incorporating data on AF and HC stream classes. However, the completeness of that data layer is likely to vary across the study area depending on land ownership and whether timber sale planning has occurred at a given site.

⁴ In reviewing the minutes, Johnson added the following reference with respect to these comments: Wilford, D.J., Sakals, M.E., Grainger, W.W., Millard, T.H., Giles, T.R., 2009, Managing forested watersheds for hydrogeomorphic risks on fans, British Columbia Ministry of Forests and Range, Forest Science Program, Land Management Handbook, 61, 62 pp.

It was noted that Icy Bay and Yakutat roads don't appear on the hazard maps. Freeman explained that was because the roads are being closed out. Some closeout is done, but the Federal Aviation Administration asked that part of the mainline be kept open until they could conclude hazardous waste cleanup at an FAA site. Staunton said that most of the road is out on the plain, and there are few residents. He noted that a Cordova Native organization was interested in maintaining the road for tourism purposes, but wasn't sure of the current status. The road crosses state and Mental Health Trust land.

Landwehr said that Yakutat isn't a hazard area.

Definitions. Landwehr drafted definitions for several terms that are in the current regulations. (see handout). The committee discussed the definitions and agreed to the language in Consensus Point 4, below. The definitions for "landslide" and "mass wasting" are the same as the definitions in the Tongass Land Management Plan.

Landwehr explained that "zero-order basins" are basins where there is not yet a defined channel.

The committee discussed whether to include a reference to a specific slope angle in the definition of "unstable or slide-prone slope". Freeman noted that in the context in which it appears in the FRPA regulations, the best management practice already applies to slopes >67%; this is in addition to that category. Hanley said it was important to be sure that the BMP should apply anywhere there is an unstable or slide-prone slope, even if it is less than 50% at the specific site. Johnson wanted to recognize the additional risk above 45-50% slopes. Staunton cautioned that a 50% figure was approximately two standard deviations below the mean angle of initiation from the studies.

The committee agreed to include 50% as a factor to focus attention on areas where other features associated with hazards also exist. The S&TC emphasized that the reference to 50% slopes is based on data from past slides in southeast Alaska, including the analyses by Landwehr and Johnson presented at the S&TC meeting today. The slope angles already used by FRPA (67%) and the USFS (72%) are based on the internal coefficient of friction of different soil materials (e.g., sand for the 72% figure).

In the context that the term is used in the FRPA regulations, "high risk of slope failure" has the same meaning as "unstable or slide-prone slope".

The committee discussed the use of five cubic feet (5 cf) in the definition for "fill material prone to mass wasting". Landwehr explained that 5cf is a parameter already used in FRPA (11 AAC 290(b)(1)A) and in waste wood standards.

Hanley noted that the Icy Bay roads were built on top of corduroy. Staunton said that he understands the need for compaction and cohesion for road stability, and for not overload unstable soils with junk. However, burying a 5cf piece of wood could be OK for temporary roads. A 6" diameter log 26 feet long may still only have 5cf of wood, but would help stabilize a road. That would be different than a short and stout piece. Freeman suggested using the term "log chunk" which is already in the BMPs and connotes a short, thick piece rather than a long, narrow log.

C4 Definitions.

Landslide: The moderately rapid to rapid downslope movement of soil and rock materials that may or may not be water saturated.

Mass Wasting: A general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another. Also Mass Movement.

Unstable or Slide Prone Slope: A slope where landslide scar initiation zone(s) exist, or where jack-strawed trees, frequently dissected slopes, a high density of Class 4 and zero order basins, or soil creep are common. Consider especially areas where these features occur on slopes greater than 50 percent.

High risk of slope failure: see known or unstable slide-prone slope.

Fill material prone to mass wasting: organic debris, a log chunk with a volume in excess of five cubic feet, organic soil, fine-textured mineral soils. A fine textured soil has a texture class of sandy-clay, silty-clay, or clay. Organic soil has more than 20 percent organic carbon. (Soil Survey Manual 1983).

Draft bibliography. Freeman handed out copies of the first draft of a bibliography of publications on landslides and mass wasting relevant to Alaska. Landwehr provided additional references on a thumb drive; Freeman will incorporate them. Baichtal noted that the USGS did slope stability analyses for southeast communities following the 1964 earthquake, and those reports can now be downloaded from the publications page on the state Division of Geological and Geophysical Surveys website. Palkovic brought a copy of a report sent by Jim Cariello on a 1988 storm event and associated slides. Freeman will send a copy to the S&TC.

Phase 2 S&TC membership. Freeman asked the committee to think about whether additional expertise is needed to proceed with Phase 2 (reviewing best management practices). The sense of the committee was that there is no specific gap presently, but if other questions arise, the S&TC may need to consult other experts.

Next meeting. The next meeting will be **April 28, 8:30-12:00** by teleconference or webinar

Handouts

- Agenda for Meeting #2, April 1, 2009
- Draft Minutes from Meeting #1, February 10, 2009
- Excerpt of Board of Forestry minutes regarding the Landslide S&TC from the March 19, 2009 Board meeting. 2 pp.
- Letter from Ed Wood, Mitkof Highway Homeowners Association, March 23, 2009. 6 pp. + 22pp. attachments.
- Notes from Dennis Landwehr, “Summary of fundings from 162 field measured landslides associated with timber harvest and road construction.” Data taken from Landwehr, 1999. 4 pp.
- Notes from Adelaide (Di) Johnson on To Do List items, “Assess the runout length of measured landslides and the relation to the initiation angle,” “Review Swanston report of Mitkof Highway for information on extent of hazard area,” and “Review extent on hazard area along Shoemaker Bay (map 7)”. 3 pp
- Benda, Lee E., and Terrance W. Cundy. 1990. Predicting deposition of debris flows in mountain channels. Canadian Geotechnical Journal. Volume 27, Number 4. pp 409-417.
- Transportation Key Terms. 3 pp
- Draft definitions of AFRPA landslide committee terms. March 2009. 1 p.
- First draft – Landslide and Mass Wasting Bibliography. March 26, 2009. 26 pp.

TO DO:

Marty and Hans:

- Check alluvial fan on Mitkof Hwy – why doesn't it show in red zone? If there is no site-specific explanation, consult Dennis and Di about data sources for AF and HC stream types to include in the model.
- Send a written description of model, including data sources and criteria to the S&TC.
- Send version 2 of the Cordova, Sitka, Haines, Hoonah hazard maps to the S&TC for review.
- Make site-specific updates to model – see chart, maps, and handouts
- Send copy of 1988 storm report from Pat to S&TC
- Edit draft definitions and send to S&TC; include in minutes as a consensus point
- Send draft minutes to S&TC
- Incorporate additional references into Bibliography and send second draft to S&TC
- Download the 1970s USGS slope stability maps for southeast communities from the DGGS website. (DNR – DGGS – publications – USGS)
- Check with Sealaska on Deer Bay road status (see map)

Dennis

- Check on the status of updated landslide inventory maps for northern POW and other areas

Greg/Pat

- Check on the status of Icy Bay road maintenance.
- Check whether logging can occur at point 3 on the Ketchikan map (see map)

• All

- Send additional references to Marty
- Review draft minutes, model description, and maps from northern area when received
- Read public comments

Site-Specific Comments on Model Version 2 Maps – April 1, 2009		
MAP	POINT	NOTE
Ketchikan	General	Clover Passage – there is a long, relatively flat area between the road and the steep ground in this area; it is low risk
Ketchikan	A	Mud Bight – there are homes south of the bight, and previous harvesting north of the bight. Land status is a mix of Cape Fox, university, state, borough, and other private.
Ketchikan	1	Past and ongoing harvest exists at this site
Ketchikan	2	Deer Mt., Past and ongoing harvest exists at this site
Ketchikan	3	Greg/Pat Check in detail – can logging occur at this site?
Ketchikan	4	Herring Bay – there has been past harvesting, but future harvesting is unlikely.
Ketchikan	↓	Private ownership at Vallenar is less extensive than shown on map
El Cap	General	<ul style="list-style-type: none"> • Salmon Bay Lake site has existing failure problems • The model picked up the known hazard areas
El Cap	5	Tern Creek is in the valley between the initiation zone and the road – slides wouldn't reach the road at this site – drop hazard zone from map
El Cap	6	There are muskegs in the runout zone between the initiation zone and the road. There is karst above the initiation zone so that there isn't water loading in the initiation zone. There is no risk of slides

		that would reach the road at this site – drop hazard zone from map
El Cap	↘	Drop hazard area shown by arrow – there is a long muskeg runout zone between the initiation zone and the road.
Coffman Cove	General	<ul style="list-style-type: none"> • There is a short till slope north of Luck Lake • The west shore of Luck Lake has moderate potential for slides, most channelized • The south end of Luck Lake has known slides • The map model matches known risk areas well
Coffman Cove	7	Includes big alluvial fan
Klawock-Control L.	8	This is the Staney Creek area. Additional slides have occurred in this area but aren't yet on the USFS slide layer. USFS is updating the landslide data layer – the new data will document more slides in the Staney Creek area
Klawock-Control L.	9	The S&TC discussed how far north the hazard polygon around Big Salt should extend. Prior harvest has occurred in this area. After reviewing the orthophotos, the S&TC recommended leaving the polygon as shown based on historic slide features. There was also a question about whether some of the hazard area was <u>below</u> the road and therefore not a public safety issue.
Craig	10	There are cliff faces in this area, and no history of slides. This is not a risk area – drop hazard zone from map
Craig	11	The rocks in this area are black shales with limestone on top. There are no past slides, and partial logging with helicopters has previously occurred in this area. Drop hazard zone from map.
Craig	12	This includes an old burn. There are public buildings below the hazard zone.
Craig	↓↓	Arrows show Port St. Nicholas area. A road extends around the north and south shores. There are known hazards in this area – it probably wasn't shown on the map because it is not a publicly-maintained road at this time. However, there are residences along much of the road and BIA is upgrading the road. Add hazard zone.
Hollis	General	<ul style="list-style-type: none"> • There was past harvesting in the hazard area north of Hydaburg. The hazard polygon is an OK call. • Check the road south of Hydaburg (about 2 miles) for hazards. Alders are growing in on the Deer Bay road. Sealaska allows use but requires a permit. Use would be primarily local Hydaburg residents, bear hunters, and incidental tourist use. Marty – check with Sealaska on status of road. • Harvesting has occurred in the vicinity of the hazard areas identified on version 1 of the maps, and state land near Hollis is not precluded from harvesting.
Hollis	13	Pass Lake area. A muskeg covers the potential runout zone in most of this area – slides would not extend to the road except at the west end south of the lake. Reduce the hazard zone to the west end of the polygon, south of the lake.
Hollis	14	Check TLMP for the status of the block that shows as off-limits to harvesting. Is it still off-limits in the current TLMP? It may be an OGR, but harvesting has previously occurred in this area.
Hollis	←	Check hazard polygon on east side of road. This is a known hazard area. Hazard polygon may just not show under slide layer, or may be truncated by non-harvest area.
Thorne Bay	General	<ul style="list-style-type: none"> • The roads east of Kasaan area closed and water barred. • Harvesting has occurred in the vicinity of the hazard areas identified on version 1 of the maps, and state land near Thorne Bay is not precluded from harvesting.
Thorne Bay	15	The east end of these polygons has a steep cut bank that has failed

		before – keep in hazard zone. Drop the west end – this is not a risk area – there’s not much steep land. The only failures are in deep till and on drumlins.
Thorne Bay	16	There are known slides along the road in this area.
Thorne Bay	←	The hazard area at Kasaan is correct, and this is in the water source area for Kasaan.
Ratz Harbor	General	Adding this map area is a good addition.
Ratz Harbor	17	There is some slide risk on the NW end of this polygon, but not within the road loop (see Google map) – drop SE portion
Wrangell	General	<ul style="list-style-type: none"> • The Zimovia loop road is well used. Wrangell is marketing it as a destination for RV camping, and there are viewpoints and public information signs • Harvesting is unlikely at the “Gateway to the Forest” site near Pat’s Lake, south of the sawmill and the Mental Health Trust Land. It is being used as a recreational attraction. • Prior harvesting occurred in the hazard zones shown in current Mental Health Trust land and land status would not preclude future harvesting • State land in hazard zones is not precluded from harvest. The Wrangell Borough may select state land in this area. • The Eastern Passage state timber sale is still under contract.
Wrangell	18	Add Eastern Passage road. The road is now maintained by the timber sale purchaser, but there is municipal interest in establishing a permanent loop road. It receives little current use because it is a dead end, but there is some firewood harvesting.
Mitkof Island	general	<ul style="list-style-type: none"> • The second version of the model covers more of the slide hazard area identified by Swanston in his report on Mitkof. Some areas are still missing apparently due to a problem in the “flow” portion of the model. • The Woodpecker loop has received public use in the past but is now getting overgrown by alders • Add Fredrick Pt. road [Check with Greg Staunton on extent] • USFS is updating the landslide data layer – the new data will document more slides on Mitkof Island • State land in the hazard zones is in the timber base. If a borough forms in the future, it might be selected.
Mitkof Island	19	State land in this area has been conveyed to Mental Health
Mitkof Island	20	Note: Timber sales in this area are limited to 10 ac; sales are dropped if there are conflicts, so there is little actual risk. No map change needed?
Mitkof Island	21	Check alluvial fan shown at arrow – it should be part of the runout zone as well as about 19 additional areas along the road. Check why these sites are not showing as hazard zones in the model. Add AF and HC streams if necessary.
Sitka area Version 1, Map 5	General	State land in hazard zones on Map 5 of original model is all designated for non-forestry uses; drop hazard areas
Cordova Version 1, Map 1	General	<ul style="list-style-type: none"> • The hazard area along Orca Inlet is steep to the water. It has been harvested previously; it would have to be a helicopter harvest. • The hazard area along Eyak Lake has large snow chutes and little timber. May be Native rather than other private land.
Haines Version 1, Map 2	General	<ul style="list-style-type: none"> • Hazard areas shown along the Klehini River on state land are in the state timber base, but the likelihood of harvest is low due to cliffs and low value timber. • The area north of Mosquito Lake has been harvested previously. There is a mix of state, Native allotment, and other private

		ownership in this area.
Hoonah Version 2, Map 3	General	<ul style="list-style-type: none"> • Check for slide hazard along Lutak Inlet • Spasski Bay is Huna Totem land and could be logged and has been logged before. There is also powerline potential. • Check land ownership in Hoonah area – some Native land shows as “other private”



**Forest Resources & Practices Act
Landslide Science & Technical Committee (S&TC)
Minutes -- Meeting #3 - April 28, 2009 Web meeting**

Attendees: Pat Palkovic, Jim Baichtal, Kevin Hanley, Kyle Moselle, Dennis Landwehr, Adelaide (Di) Johnson, Marty Freeman, and Ralph Swedell. Greg Staunton was absent. Hand Buchholdt, Division of Forestry GIS Specialist attended part of the meeting.

Agenda. No changes

April 28, 2009 minutes. The minutes were adopted with minor corrections.

Updates from to-do list.

- Send copy of 1988 storm report from Pat to S&TC – *report sent 4/22/09*
- Edit draft definitions and send to S&TC -- *included in minutes as a consensus point*
- Send draft minutes to S&TC -- *done*
- Incorporate additional references into Bibliography and send second draft to S&TC – *references received prior to 4/26/09 have been incorporated into the bibliography.*
Landwehr noted that he has additional references that don't show up yet. Freeman will work with him to make sure they get included.
- Download the 1970s USGS slope stability maps for southeast communities from the DGGS website. *Baichtal sent references and links to these maps, and those have been incorporated into the bibliography*
- Check with Sealaska on Deer Bay road status. *No response received from Sealaska to date. Joel Nudelman (DOF) said he had driven the Deer Bay road for the road condition survey and it was usable.*
- Check on the status of updated landslide inventory maps for northern POW and other areas -- *Landwehr sent copies of the updated data layer, which Buchholdt incorporated into the hazard model.*
- Check on the status of Icy Bay road maintenance. *Palkovic reported that all but 13 miles of the Icy Bay roads have been closed out. The remaining 13 miles is inactive, but may get some use by hunters and guides.* Hanley noted that the remaining road is not in landslide terrain, so no hazard map is needed for the Icy Bay area.

Public comments. Freeman distributed a copy of public comments received since the April 1, 2009 meeting. They included three e-mails from Ed Wood commending the S&TC on their efforts, reiterating interest in having the Forest Resources and Practices Act (FRPA) address public safety, describing past slides at Taain Creek, requesting a copy of the draft Mitkof hazard scoping map, and commenting on the

report on 1988 landslides in the Petersburg area. Freeman sent a copy of the draft Mitkof hazard scoping map on April 27, 2009.

Mike Sallee also requested a copy of the draft hazard scoping maps, and Freeman sent the maps on April 27, 2009.

Review of version 3 maps from the hazard scoping model

Ketchikan area map

- Can logging occur near Ketchikan map (see v. 3 map, point #3)? Palkovic reported that the steep area at this site is on the Ketchikan bypass. There is a little standing timber, but not much of commercial value. The commercial potential is only on the backside of the steep area. Drop the large polygon (yellow X on map) and keep the small one (yellow circle). Swedell noted that the state is doing reconnaissance on a future road to Carroll Inlet (the White River road). Freeman said that the scoping process is a snapshot in time. As the S&TC has clarified in the consensus points, risk locations could change as various contributing factors change over time.
- The committee asked about the road from the Ketchikan airport to the Seley mill. The group agreed that slides wouldn't run to the road in this area.
- Johnson and Moselle asked about the unmarked patches within the polygons at Mud Bay and further south along the Tongass Narrows. It appears that some sites are not included that are downslope of initiation areas. Buchholdt explained that the exclusions are due to ridges that would split a slide path from upslope events, and the ridges themselves are less than 50% slopes. They don't appear as ridges on the 100-foot contour topographic maps, but do show up on the 20-meter DEM used for the model. Moselle said that the model is OK if it's based on the DEM.
- Palkovic confirmed that logging occurred previously in Herring Bay, but that area now is a mix of a residential area and a hatchery site. Ben Fleenor used to own a sawmill in this area, but he died, and the mill has been developed as a tourist attraction. It is also part of the area mapped by Ketchikan as part of the Mountain Point watershed. Landwehr added that the forest in this area is now part of a zipline tour, and the USFS land won't be logged. The group discussed whether or not the hazard zone at Herring Bay should be deleted because harvesting is unlikely. Moselle said that it would be harder to explain the model if we base decisions on the likelihood of harvesting rather than plan designations that determine whether or not harvesting is allowed. Johnson agreed. Palkovic concurred except for areas that are solely residential and not commercial forest land. The committee decided to leave in area 4 on the Ketchikan map since nothing prohibits harvesting in this area and there is a mix of land ownerships. Harvesting may or may not occur.

[**Note:** Following the meeting, Palkovic checked borough maps for the local lots. She reported that in the residential area, lots are less than 10 acres. Harvesting would be primarily for land use conversion, and would not be subject to FRPA. Based on this info, I suggest that we keep the hazard area below initiation zone on USFS land in this area, but drop the portion where the initiation zone would be in the residential area.]

- Landwehr noted that the model is doing a good job of picking up gorges with instability concerns near Silvis Lake.

Hollis area map

- The group discussed the roads between Hydaburg, Deer Bay, and Polk Inlet. Freeman reported that the DOF road condition survey crew drove the road in 2007. Palkovic questioned how usable it is now. Landwehr noted that it is not maintenance level 3 or better, but if it gets local use, should be included. It is not gated. Sealaska and Haida Corporation have a mutual road use agreement. The use level has varied over time. The condition of the road has also varied depending on logging

activity. Non-shareholders are supposed to have permission from the Native corporation to use the road. Hanley suggested leaving it on the map with recognition that the landowners have the option of closing the road. Landwehr commented that this forms a loop road with the Beaver Creek – Polk Inlet road system, which may attract more public use than some maintenance level 2 roads.

[**Note:** following the meeting Palkovic drove a portion of the road, talked with Sealaska, and sent photos. The initial mile of the road to the community water source is maintained and gets use. Beyond that driving is difficult and use is incidental. It is not possible to drive the loop at this time due to washout. Based on the maintenance level and limited use, I suggest we only show the first mile on the hazard maps. – Marty]

Wrangell map

- Palkovic reported that the state timber sale along the Eastern Passage road is currently inactive. Buchholdt observed that there are some small hazard polygons along the ridge ends that don't show under the slope data layer, but not a lot.

Hoonah map

- Moselle noted that the maps now show the road around Sophie Point. Baichtal said that the road continues to Spasski Bay and is regularly used by tour buses in the summer. The USFS Iyouktug timber sale is also continuing.

Haines map

- In response to a question, Buchholdt explained that there is landslide hazard above Klukwan, but not harvestable timber. There are some Native Allotments in hazard areas.

Cordova

- Palkovic commented that the eastern hazard area is an avalanche zone, and therefore largely untimbered. She suggested dropping it. Landwehr noted that there are some treed areas and recommended leaving it in. The areas were left in as mapped.

Model description. Buchholdt and Freeman will provide the committee with a description of the data layers and sources, and the criteria used in combining the layers. Freeman emphasized that the maps are a tool for the Board of Forestry to use in deciding whether or not to proceed with a “Phase 2” review of FRPA best management practices. As noted in Consensus Point 1, they are not sufficient for site-specific planning.

Johnson thanked Buchholdt for his great work putting the model together. She also wants to review the model criteria. She stressed that some detailed site checks of accuracy are needed. Adding in the stream layer would be helpful. Buchholdt said that he can hydroreinforce the model.

Johnson commented that regardless of the intent, members of the public will want to zoom in on specific sites. Swedell agreed, and said that the maps need a disclaimer that they are intended for large-scale overview only and not intended for detailed land use planning. They are also tied specifically to commercial timber harvesting, not to other activities that could be associated with landslides.

As noted in the discussion of the Mud Bay area, above, some hazard polygons have exclusions for ridges that produce divergent flow lines. Buchholdt showed a close-up example of the model's flow lines from the Petersburg area. Swedell and others suggested showing the whole polygon as a hazard zone in these cases – at this scale they shouldn't be subdivided – the whole polygon has hazard potential. Buchholdt said that he could both add streams to the model and fill in the voids within the polygons. Landwehr offered to upload the USFS stream layer.

As a result of the above discussion on the hazard model, the committee amended consensus points 1 and 3 as follows.

C1am. The scoping model and associated maps are tools for assessing the general scope of landslide hazards and public safety risks associated with **commercial timber harvesting subject to FRPA** [FOREST OPERATIONS]. They do not replace the need for site-specific analysis and design of timber sales and access roads.

C3am. The scoping model is a first approximation based on available data of the geographic extent of potential landslide hazards in areas open to **commercial timber harvest** [FOREST] operations **subject to FRPA** where there is public use, in the portion of coastal Alaska from Cordova south.

For this model, public use is defined as

- roads open to the public and monitored by DOT,
- US Forest Service roads in Objective Maintenance Level categories 3, 4, and 5, and
- where known, **other** roads open to the public and maintained by local entities.

The accuracy of the model is limited by the detail of available Digital Elevation Models (DEMs) and the ability to model potential runout zones at a regional scale.

The model also incorporates site-specific modifications based on the local knowledge and best professional judgment of the Science and Technical Committee, and the Committee's review of available digital orthophotos.

Bibliography. Freeman reported that she added references to the landslide bibliography as received. She will incorporate the additional references from Landwehr. Many, but not all of the references have abstracts. Moselle suggested that if there are key references, abstracts should be added. Landwehr said key references are those that are important to understanding slide response to timber harvesting in southeast Alaska, not papers on slides in Japan or in housing areas. There are about 8-10 references that are frequently cited in NEPA documents. He will identify those and send pdf files. We should include abstracts for those papers in the bibliography. Freeman asked that committee member review the bibliography and identify any other key references that still need abstracts.

Baichtal commented that the USGS slope stability maps for southeast communities from the 1970s are largely within city limits, and therefore have limited overlap with commercial forestry operations. People can print the maps if needed. Links to web sources for the maps are included in the bibliography.

Next steps. The committee agreed to meet again by web conference on **Thursday July 16, 8:30-12:00.** At that meeting we will review the model documentation, and map changes made following today's recommendations. Freeman will present the results of the scoping review to the Board of Forestry at their August meeting. The Board meeting is scheduled for August 11-13 on Prince of Wales Island. The first day and a half will be a field trip for the Board, including a look at some of the mapped hazard areas, as well as second-growth harvesting, and wood energy projects. The meeting will be from midday August 12 through the 13th. DOF is identifying the specific meeting site. Freeman will send the Board agenda to the S&TC members, and encouraged anyone available to attend.

To-Do List.

Freeman and Buchholdt

- Include scoping in map titles, include C1 and C2, and attach model description and C3 (*in progress*)
- Write model description and send to S&TC– data sources and model criteria. (*done*)
- Add streams to hazard model. Landwehr will send USFS stream layer. (*done*)
- Fill in voids in polygons from divergent flow models. (*in progress*)

All

- Review draft minutes and send corrections to Freeman
- Review the bibliography and identify key references that still need abstracts. (*ongoing*)

Handouts

Agenda #3 April 28, 2009

Minutes #2, April 1, 2009

Map notes from meeting #2, April 1, 2009

Public comments received since April 1, 2009 meeting

Site-Specific Comments on Model Version 2 Maps – April 1, 2009			
MAP	POINT	APRIL 1 NOTE	APRIL 28 UPDATE – recommended v. 3 map changes
General			<ul style="list-style-type: none"> • Add stream layer • Fill in voids from divergent slopes within hazard polygons
Ketchikan	General	Clover Passage – there is a long, relatively flat area between the road and the steep ground in this area; it is low risk	
Ketchikan	A	Mud Bight – there are homes south of the bight, and previous harvesting north of the bight. Land status is a mix of Cape Fox, university, state, borough, and other private.	
Ketchikan	1	Past and ongoing harvest exists at this site	
Ketchikan	↓		Fill in area in yellow circle. This spot is <50% slope, but in a location that could receive debris from upslope.
Ketchikan	2	Deer Mt., Past and ongoing harvest exists at this site	Future logging is questionable at this site, but most of hazard area should remain at this time. Check the road status to Lower Ketchikan Lake – it may be gated to limit watershed access. Drop the SW part of the polygon – it is an existing material site.
Ketchikan	3	Check in detail – can logging occur at this site?	The steep area is the Ketchikan bypass. There's a little standing timber, but the only area with commercial potential is on the back side of the steep area. Drop the large

			polygon (yellow X) and keep polygon in yellow circle
Ketchikan	4	Herring Bay – there has been past harvesting, but future harvesting is unlikely.	Per notes on land status, drop hazard zone in “other private land” area; keep the portion in and below USFS land.
Ketchikan	↓	Private ownership at Vallenar is less extensive than shown on map	
El Cap	General	<ul style="list-style-type: none"> • Salmon Bay Lake site has existing failure problems • The model picked up the known hazard areas 	
El Cap	5	Tern Creek is in the valley between the initiation zone and the road – slides wouldn’t reach the road at this site – drop hazard zone from map	
El Cap	6	There are muskegs in the runout zone between the initiation zone and the road. There is karst above the initiation zone so that there isn’t water loading in the initiation zone. There is no risk of slides that would reach the road at this site – drop hazard zone from map	
El Cap	↘	Drop hazard area shown by arrow – there is a long muskeg runout zone between the initiation zone and the road.	
Coffman Cove	General	<ul style="list-style-type: none"> • There is a short till slope north of Luck Lake • The west shore of Luck Lake has moderate potential for slides, most channelized • The south end of Luck Lake has known slides • The map model matches known risk areas well 	
Coffman Cove	7	Includes big alluvial fan	
Klawock-Control L.	8	This is the Staney Creek area. Additional slides have occurred in this area but aren’t yet on the USFS slide layer. USFS is updating the landslide data layer – the new data will document more slides in the Staney Creek area	
Klawock-Control L.	9	The S&TC discussed how far north the hazard polygon around Big Salt should extend. Prior harvest has occurred in this area. After reviewing the orthophotos, the S&TC recommended leaving the polygon as shown based on historic slide features. There was also a question about whether some of the hazard area was <u>below</u> the road and therefore not a public safety issue.	
Craig	10	There are cliff faces in this area, and no history of slides. This is not a risk area – drop hazard zone from map	
Craig	11	The rocks in this area are black shales with	

		limestone on top. There are no past slides, and partial logging with helicopters has previously occurred in this area. Drop hazard zone from map.	
Craig	12	This includes an old burn. There are public buildings below the hazard zone.	
Craig	⇓	Arrows show Port St. Nicholas area. A road extends around the north and south shores. There are known hazards in this area – it probably wasn't shown on the map because it is not a publicly-maintained road at this time. However, there are residences along much of the road and BIA is upgrading the road. Add hazard zone.	
Hollis	General	<ul style="list-style-type: none"> • There was past harvesting in the hazard area north of Hydaburg. The hazard polygon is an OK call. • Check the road south of Hydaburg (about 2 miles) for hazards. Alders are growing in on the Deer Bay road. Sealaska allows use but requires a permit. Use would be primarily local Hydaburg residents, bear hunters, and incidental tourist use. Marty – check with Sealaska on status of road. • Harvesting has occurred in the vicinity of the hazard areas identified on version 1 of the maps, and state land near Hollis is not precluded from harvesting. 	Per notes in minutes, keep the first mile of the Deer Bay road; delete the remainder of the road
Hollis	13	Pass Lake area. A muskeg covers the potential runout zone in most of this area – slides would not extend to the road except at the west end south of the lake. Reduce the hazard zone to the west end of the polygon, south of the lake.	
Hollis	14	Check TLMP for the status of the block that shows as off-limits to harvesting. Is it still off-limits in the current TLMP? It may be an OGR, but harvesting has previously occurred in this area.	This block is an OGR on the TLMP amendment map
Hollis	←	Check hazard polygon on east side of road. This is a known hazard area. Hazard polygon may just not show under slide layer, or may be truncated by non-harvest area.	
Thorne Bay	General	<ul style="list-style-type: none"> • The roads east of Kasaan area closed and water barred. • Harvesting has occurred in the vicinity of the hazard areas identified on version 1 of the maps, and state land near Thorne Bay is not precluded from harvesting. 	
Thorne Bay	15	The east end of these polygons has a steep cut bank that has failed before – keep in hazard zone. Drop the west end – this is not a risk area – there's not much steep land. The only failures are in deep till and on drumlins.	

Thorne Bay	16	There are known slides along the road in this area.	
Thorne Bay	←	The hazard area at Kasaan is correct, and this is in the water source area for Kasaan.	
Ratz Harbor	General	Adding this map area is a good addition.	
Ratz Harbor	17	There is some slide risk on the NW end of this polygon, but not within the road loop (see Google map) – drop SE portion	
Wrangell	General	<ul style="list-style-type: none"> • The Zimovia loop road is well used. Wrangell is marketing it as a destination for RV camping, and there are viewpoints and public information signs • Harvesting is unlikely at the “Gateway to the Forest” site near Pat’s Lake, south of the sawmill and the Mental Health Trust Land. It is being used as a recreational attraction. • Prior harvesting occurred in the hazard zones shown in current Mental Health Trust land and land status would not preclude future harvesting • State land in hazard zones is not precluded from harvest. The Wrangell Borough may select state land in this area. • The Eastern Passage state timber sale is still under contract. 	
Wrangell	18	Add Eastern Passage road. The road is now maintained by the timber sale purchaser, but there is municipal interest in establishing a permanent loop road. It receives little current use because it is a dead end, but there is some firewood harvesting.	
Mitkof Island	general	<ul style="list-style-type: none"> • The second version of the model covers more of the slide hazard area identified by Swanston in his report on Mitkof. Some areas are still missing apparently due to a problem in the “flow” portion of the model. • The Woodpecker loop has received public use in the past but is now getting overgrown by alders • Add Fredrick Pt. road [Check with Greg Staunton on extent] • USFS is updating the landslide data layer – the new data will document more slides on Mitkof Island • State land in the hazard zones is in the timber base. If a borough forms in the future, it might be selected. 	
Mitkof Island	19	State land in this area has been conveyed to Mental Health	
Mitkof Island	20	Note: Timber sales in this area are limited to 10 ac; sales are dropped if there are conflicts, so there is little actual risk. No map change needed?	

Mitkof Island	21	Check alluvial fan shown at arrow – it should be part of the runout zone as well as about 19 additional areas along the road. Check why these sites are not showing as hazard zones in the model. Add AF and HC streams if necessary.	
Sitka area Version 1, Map 5	General	State land in hazard zones on Map 5 of original model is all designated for non-forestry uses; drop hazard areas	
Cordova Version 1, Map 1	General	<ul style="list-style-type: none"> The hazard area along Orca Inlet is steep to the water. It has been harvested previously; it would have to be a helicopter harvest. The hazard area along Eyak Lake has large snow chutes and little timber. May be Native rather than other private land. 	
Haines Version 1, Map 2	General	<ul style="list-style-type: none"> Hazard areas shown along the Klehini River on state land are in the state timber base, but the likelihood of harvest is low due to cliffs and low value timber. The area north of Mosquito Lake has been harvested previously. There is a mix of state, Native allotment, and other private ownership in this area. Check for slide hazard along Lutak Inlet 	
Hoonah Version 2, Map 3	General	<ul style="list-style-type: none"> Spasski Bay is Huna Totem land and could be logged and has been logged before. There is also powerline potential. Check land ownership in Hoonah area – some Native land shows as “other private” 	<ul style="list-style-type: none"> Extend the Sophie Point road to Spasski Bay (red arrow on map) – it gets tour bus use. See



**Forest Resources & Practices Act
Landslide Science & Technical Committee (S&TC)
Minutes -- Meeting #4 - July 16, 2009 Web meeting**

Attendees: Pat Palkovic, Jim Baichtal, Kevin Hanley, Kyle Moselle, Dennis Landwehr, Adelaide (Di) Johnson, Marty Freeman, and Ralph Swedell. Greg Staunton was absent. Hans Buchholdt, Division of Forestry GIS Specialist attended part of the meeting.

Agenda. No changes

April 28, 2009 minutes. The minutes were adopted without corrections.

Updates and committee comments

Pat Palkovic reported that the state timber sale on Wrangell Island remains inactive, and the future of a loop road around the northern end of the island remains uncertain.

The committee agreed with the recommendations in the notes from Meeting #3:

Note 1 (p.2 of Minutes #3): Following Meeting #3, Palkovic checked borough maps for the local lots. She reported that in the residential area, lots are less than 10 acres. Harvesting would be primarily for land use conversion, and would not be subject to FRPA. Based on this info, the committee agreed that the maps keep the hazard area below the portion of the initiation zone on USFS land in this area, but drop the portion where the initiation zone is in the residential area.

Note 2 (p. 3 of Minutes #3): Following the Meeting #3, Palkovic drove a portion of the road to Deer Bay, talked with Sealaska, and sent photos to the committee. She reported that the initial mile of the road to the community water source is maintained and gets use. Beyond that, driving is difficult and use is incidental. It is not possible to drive the loop at this time due to washout. Based on the maintenance level and limited use, the committee agreed that the hazard maps should show just the first mile of the road.

Johnson commented that subsequent analysis and testing of the landslide hazard model could be done if funding is available in the future.

Review of Landslide Modeling Description

Hans Buchholdt presented the description of the landslide hazard model, including data layers, analysis steps, and a flow chart of the model (attached). He noted that he is still adjusting the model to address islands within flow paths that currently don't show as hazard areas. He is confident that this issue can be solved. Johnson asked whether the buffer could just be widened to cover the islands. Buchholdt said that was one option.

Freeman asked how University land was addressed. Buchholdt said that a layer similar to the Mental Health Trust land was used, and he will add a note on that to the modeling description.

Johnson and Landwehr asked whether the map shows the 50% and 67% slope categories separately, or combined. Hans replied that the slope categories are shown separately, but the hazard area is based on the combined slopes (i.e., >50%) and shows as a single hazard category. Freeman noted that the committee previously commented that the map based on the combined slopes better matched known hazard areas. Moselle added that some of the papers discussed previously also supported including slopes > 50%.

Johnson asked that the flow chart be split into separate charts for each analysis step so that the polygons are easier to read.

The Committee thanked Buchholdt for his work on the model and description.

Bibliography update

The committee reviewed the status of the bibliography. Members commented that the color coding doesn't show. Freeman will increase the symbol size, drop the color-coding, and possibly indent the highlighted papers to help them show up.

Freeman noted that two highlighted papers, Wilford, et al., 2009 and Benda and Cundy, 1990 don't have annotations. Johnson volunteered to supply abstracts.

The committee discussed whether the highlighted papers were the appropriate ones, and fit the description in the minutes from Meeting #3 for frequently cited papers. Landwehr and Johnson will review them to make sure papers frequently cited in Alaska documents are included, and that the highlighted papers are indeed key publications.

After discussion, the committee recommended dropping the annotations from papers outside Alaska except for the highlighted papers. The shorter format will make the document more usable.

Landwehr commented that the list of references for Alaska is pretty exhaustive, but the bibliography probably misses many from other areas. Freeman will note that in the introduction to these sections.

Board of Forestry meeting

Freeman reported that the next Board of Forestry meeting is August 11-13 in Craig, Alaska, and will include a presentation on the landslide hazard scoping on the morning of August 13. Any S&TC members are heartily welcome to attend. Freeman will send the agenda to the S&TC as soon as it is final. Freeman will present a summary of the S&TC scoping work. The Board packet will include minutes and map notes from the S&TC meetings, the bibliography, the model description, and if available in time, the hazard maps.

Next meeting. The S&TC will have a web meeting from 1:00-3:00 on July 27th to review version 4 of the hazard maps.

Note: No public comments were received since Meeting #3.

To Do List

Freeman

- Update bibliography
 - delete abstracts from papers outside Alaska except for the highlighted papers
 - add abstracts for Wilford, et al., 2009 and Benda and Cundy, 1990
 - increase symbol size

Buchholdt

- Include scoping in map titles, include C1 and C2, and attach model description and C3 (*in progress*)
- Fill in voids in polygons from divergent flow models. (*in progress*)
- Update version 4 maps to include the site-specific corrections in the map notes from Meeting #3.

Johnson

- Send abstracts for Wilford, et al., 2009 and Benda and Cundy, 1990 papers to Freeman for inclusion in the bibliography

Johnson and Landwehr

- Double-check highlighted articles to be sure that they are the key papers, and that the papers frequently cited in Alaska documents are highlighted.

All

- Review draft minutes and send corrections to Freeman

Handouts

Agenda #4, July 16, 2009

Draft Minutes #3, April 28, 2009

Map notes from meeting #3, April 28, 2009

Landslide Modeling Description, May 8, 2009

Draft bibliography, May 1, 2009



**Forest Resources & Practices Act
Landslide Science & Technical Committee (S&TC)
Minutes -- Meeting #5 - July 27, 2009 Web meeting, 1:00 - 1:45 p.m.**

Attendees: Pat Palkovic, Jim Baichtal, Kevin Hanley, Kyle Moselle, Dennis Landwehr, Adelaide (Di) Johnson, Marty Freeman, and Greg Staunton. Ralph Swedell was absent. Hans Buchholdt, Division of Forestry GIS Specialist attended part of the meeting.

Agenda. No changes

April 28, 2009 minutes. The minutes were adopted without changes.

Public comments. Ed Wood with the Mitkof Highway Homeowners Assn. e-mailed to ask for an update on the S&TC progress. Freeman will distribute the minutes to meeting #4 (July 16) now that they are final. Wood also copied Freeman on a letter to Sen. Murkowski endorsing a land exchange between the US Forest Service and Mental Health Trust for the Trust land above the Mitkof Highway. Freeman will copy the e-mail and letter to the S&TC.

Model description. Freeman reported that a reference to university lands was added to the model description, and a cover page was inserted that highlights the S&TC consensus points regarding the scoping maps.

Buchholdt is updating the flow charts to include the process used to fill in “voids” that show small non-hazard areas surrounded by hazard zones. He will also break the chart into smaller pieces so that they are easier to read.

Scoping maps – version 4. Buchholdt made the following changes to the prior maps based on the S&TC recommendations

- Added stream layer
- Filled in “voids” where small non-hazard areas were surrounded by hazard zones.
- Made site-specific changes to Ketchikan area, Pt. Sophia Road, and Deer Bay Rd
- Added “scoping” to each map title.

Staunton questioned the extent of hazards at two specific sites on the south end of Mitkof Island based on flat muskegs between the steep slopes and road. Buchholdt agreed that slides were unlikely to reach the road under those conditions. It is difficult to eliminate that site-specific condition from the model, but those specific sites can be deleted from the map. Staunton, Palkovic, and Landwehr will review the specific sites in more detail and make a recommendation to the S&TC.

Staunton also noted that a piece of the road along Eastern Passage on Wrangell Island is not constructed, only flagged in, and future harvest of the timber sale that was designed to build the road is uncertain. Freeman said that the maps show existing roads, so that the section that has not been built should be dropped. Staunton will send a map of the completed road to Buchholdt.

Moselle, Hanley, and Johnson all complimented Buchholdt on a job well done developing the scoping maps. Johnson said, “they’re perfect for scoping”.

Bibliography. Freeman made the following edits to the bibliography since the last meeting:

- Added abstracts for Wilford and for Benda & Cundy
- Added Swanston 1974 as a highlighted paper
- Added a note to the introduction that the search for papers outside AK was less exhaustive than within state
- Reformatted the bibliography to drop abstracts for non-Alaska papers except for the highlighted papers, drop color-coding, and make source code symbols bigger

Board of Forestry preparation. Freeman reported that the packets for the Board of Forestry meeting include the minutes from the first three meetings and the bibliography. The minutes from meetings #4 and #5 will be added as handouts at the meeting. The Board will also get a separate sheet highlighting the S&TC consensus points and definitions, copies of public comments, the model description, and maps. Freeman is preparing a powerpoint presentation summarizing the committee's work and showing the model description and maps. The Board will determine whether to direct the S&TC to review existing forest practices standards with regard to public safety issues.

Freeman reiterated that S&TC members were very welcome at the Board meeting.

Hanley recommended that Freeman make copies of the hazard maps for the areas that the Board field trip will visit. Freeman agreed and will try to get enlargements for those areas. Palkovic said that the trip will likely visit the Port. St. Nicholas, Klawock L., or Big Salt areas. Landwehr noted that the Big Salt area is a good site to visit – there are some small recent slides north of Black Bear that are visible from the road. The Harris River and Fubar Creek areas are also good sites to visit.

Freeman suggested that the S&TC review the remaining items on the maps (south Mitkof, Wrangell road) and flow charts by e-mail prior to the Board meeting.

Adjourn 1:40 p.m.

To Do List

- Staunton – send map of incomplete section of Eastern Passage road to Buccholdt.
- Staunton, Palkovic, Landwehr – review two sites on southern Mitkof for hazards based on site-specific conditions
- Freeman
 - send finished bibliography and Minutes #4 to S&TC
 - send correspondence from Ed Wood to S&TC
 - distribute S&TC minutes #4 to mail list
 - prepare presentation for Board of Forestry
- Buchholdt
 - make site-specific changes to Mitkof and Wrangell maps
 - update flow chart to include process for filling “voids”
 - enlarge flow chart sections for legibility
 - analyze extent of hazard in terms of road miles, acreage, and ownership for the Board



**Forest Resources & Practices Act
Landslide Science & Technical Committee (S&TC)
Minutes -- Meeting #6 - September 28, 2009 Web meeting, 9:30-10:30 a.m.
and notes on subsequent reviews**

Attendees: Kevin Hanley, Dennis Landwehr, Adelaide (Di) Johnson, Marty Freeman, and Greg Staunton. Ralph Swedell, Pat Palkovic, and Jim Baichtal, and Kyle Moselle were absent.

Agenda. No changes

Review Board of Forestry input and public comments. Freeman summarized the Board presentation and discussion. Moselle and Hanley were also present at the Board meeting.

One Board member requested an opportunity for landowners to review the landslide maps, and expressed concern about using the 50-67% category because it goes beyond the standard in the FRPA regulations. Freeman explained that for the purposes of scoping the S&TC found that including the 50-67% slope category better matched information on known slide occurrences.

Rep. Peggy Wilson listened to the Board meeting on teleconference, and commented that policy makers have to be concerned with public safety.

The Board asked that the map show hazards in residential areas as a separate category from hazards adjacent to public roads only.

The Board asked for an administrative group similar to previous Implementation Groups that would be charge with, “identifying a menu of options both within and outside FRPA, recognizing past processes and principles used in developing the FRPA, identifying additional data needs, and recommending options to the Board.” Freeman reported that she is in the process of identifying landowners, local governments, and other affected entities in the study area (*see handout*), and working on an initial list of types of approaches that could be used to address landslide hazards. Options could include both technical forestry practices (e.g., harvest systems); and actions outside FRPA (e.g., local ordinances, insurance). She will ask for more clarification on what the Board wants from the administrative group at the October 7-8 Board meeting prior to convening a group.

Pat Palkovic sent Freeman a press release and news article about recent slides that reached the Mitkof Highway south of Petersburg. Freeman will send copies to the S&TC, and try to get more detailed information on the slide location.

Landowner review of hazard maps. Freeman is contacting forest landowners for feedback on the landslide hazard maps. In particular, she is looking for information on areas not open to harvest, residential areas, and site specific information that would reduce hazards. Copies of the maps have been sent to Native village corporations with land in the hazard areas – Eyak, Huna Totem, Shaan-Seet, Klawock Heenya, Cape Fox, Haida Corporation, and Kivilco, and to Clare Doig of Forest Land Management, Inc., who is a forestry consultant for many of the village corporations.

Eyak returned a map showing which areas are open to commercial harvesting, and which are closed. The hazard zones on Eyak land are within conservation easements that prohibit commercial timber harvesting so these areas were dropped from the maps.

Doig commented on the maps for several areas –

- The Spasski Road on Huna Totem land is private, not open to public. Freeman said that the Spasski Road has been dropped from the maps.
- The runout zone on the mapped hazard area at the end of the road that runs east of Hoonah may prevent slides from reaching the road. This area was logged in the mid-1980s.
- Topography in the large hazard zone on Cape Fox land on the road to Lake Harriet Hunt may direct landslides parallel to the road rather than across it, but Doig wasn't sure about this.
 - Landwehr noted that at least the south half of this zone definitely has potential for depositing material on the road – two prior slides crossed the road. [Note: After the meeting, Staunton and Clarence Clark, DOF also reviewed this area and agreed that the maps are appropriate given the scale of the scoping process.]
 - No change to maps
- Along Klawock Lake, Doig questioned the extent of the runout zone where it extends below the road. This area was previously logged. The polygon showing as Municipal/Other Private land on the south shore of Klawock Lake is Shaan-Seet land.
- Along Port St. Nicholas some areas are steep and some are not. Flats in some areas would prevent runout to the road.
 - [Note: After the meeting, Staunton and Clark looked at the Port St. Nicholas maps and both felt they were good for the given scale. Some land could be excluded due to the lot sizes on private land, but they do not think it is worth it at the given scale.]
- The hazard site at Kasaan is in the town watershed. This area was previously harvested. It is largely a muskeg area, and slides wouldn't reach the road.
 - Landwehr commented that there have been prior problems with slides plugging the water intake in this area.
 - [Note: After the meeting, Louis Thompson, Kavalco President and CEO, called. He will review the map of this area. He also reported a previous slide in this area. He noted that the community is working to move the water distribution system out of the slide area.]

Freeman also talked with Dave Phillips at Chugach Alaska regional corporation. He said that their land is away from residential areas and public roads.

Freeman talked with Ron Wolfe of Sealaska who said that there are no hazard areas adjacent to populated areas on their land – land selection rules kept them out of the core townships around villages.

Freeman sent copies of the maps to the foresters for the University of Alaska Land Management Office and the Mental Health Trust Land Office, but has not received comments from the trusts yet. She also noted that the amount of land in hazard zones in the Other Private/Local Government category is probably overestimated. Many private parcels are too small for FRPA to apply, and many private owners are unlikely to harvest. Similarly, city and borough lands were often selected for residential/commercial development or recreation purposes and are not open to logging.

S&TC map review. The Committee reviewed version 7 map updates. The main difference is that hazard zones are split into two categories – populated areas, and areas with public roads only. As previously noted, Eyak land under conservation easements was deleted from the hazard zones, and the Spasski Road and associated hazard zones were deleted.

Land ownership data. Freeman showed a chart of local governments and landowners showing which entities have hazards on their land, and which have hazard areas adjacent to populated areas. Landowners of hazard areas adjacent to populated areas include Shaan-Seet, Klawock Heenya, Mental Health Trust, State of Alaska, US Forest Service, and possibly Kavalco and the University of Alaska. The municipalities of Ketchikan (both city and borough), City of Cordova, and Haines Borough may also own land in these areas, but it is uncertain whether these lands are open to commercial timber harvesting.

Overall, approximately 51,715 acres in mapped hazard zones, of which approximately 7,566 acres is adjacent to populated areas, mostly in Native Corporation (2,494 acres) and Municipal/Other Private (1,736 acres) ownership. As noted above, the acreage in Municipal/Other Private ownership likely overestimates the area open to commercial timber harvesting.

Next steps. The next steps are to:

- complete the landowner review of the maps,
- present the updated maps and data on the acreage and ownership in hazard zones adjacent to populated areas to the Board of Forestry on October 7, and
- get clarification from the Board on the charge for the “Administration Group”.

To Do:

- Freeman will work with Buchholdt to update the maps
 - Check the land status of the “Municipal/Private” parcel on the south shore of Klawock Lake
 - Incorporate any changes resulting from landowners/S&TC review
 - Provide a larger scale version of the hazard model to the S&TC; update model for splitting populated areas into hazard zones.
 - [Note: a small amount of USFS “Natural Land Cover” showed up in the hazard map. Freeman will work with Buchholdt to delete that area from the hazard zones.]
 - Send copies of version 7 maps, acreage data, articles on Petersburg slides, public letters, and Board of Forestry agenda to S&TC
- Dennis Landwehr, Greg Staunton, and Clarence Clark – review the mapped hazards areas around Ketchikan (done), Port St. Nicholas (done), Klawock Lake, and the east end of the road east of Hoonah. Please also check whether the Kasaan hazard site is a direct public safety concern (people) or a hazard to the water infrastructure only.
- Landwehr – review areas mapped as hazards adjacent to populated areas in the Whale Pass area.

Handouts

Agenda

Version 7 maps

Land owner list

Chart of acreage in hazard zones by landowner

Landslide Scoping Model

I. Background and caveats

This document describes the information used to develop scoping maps to help the Landslide Science and Technical Committee (LS&TC) and Alaska Board of Forestry assess the geographic extent of potential risks to public safety. The LS&TC emphasizes the following caveats when using these maps.

1. The scoping model and associated maps are tools for assessing the general scope of landslide hazards and public safety risks associated with commercial timber harvesting subject to FRPA. They do not replace the need for site-specific analysis and design of timber sales and access roads.
2. The location of public safety hazards will change over time as patterns of public use, public road access, land ownership, timber harvesting and other land uses change.
3. The scoping model is a first approximation based on available data of the geographic extent of potential landslide hazards in areas open to commercial timber harvest operations subject to FRPA where there is public use, in the portion of coastal Alaska from Cordova south.

For this model, public use is defined as:

- roads open to the public and monitored by DOT,
- US Forest Service roads in Objective Maintenance Level categories 3, 4, and 5, and
- where known, other roads open to the public and maintained by local entities.

The accuracy of the model is limited by the detail of available Digital Elevation Models (DEMs) and the ability to model potential runout zones at a regional scale.

The model also incorporates site-specific modifications based on the local knowledge and best professional judgment of the Science and Technical Committee, and the Committee's review of available digital orthophotos.

II. Landslide Modeling Description

Hans Buchholdt, DNR Division of Forestry

July 27, 2009

The landslide GIS model used for the scoping process for public hazards associated with commercial forest activities uses four GIS layers as inputs:

- 1) Land Status layer – This layer of land ownership and land management was assembled using the Tongass National Forest land ownership layer, which was downloaded from the UAS GINA website. This layer was merged with Alaska Mental Health Trust lands obtained from the AMHT, university land ownership from the State of Alaska, and land management information from the Alaska Protected Areas Database (Nature Conservancy, Alaska, 2006) to identify areas which are managed for natural land cover and are thus not open to commercial forest activities. As well as showing land ownership/management on the maps, the No_Comm_Timber is extracted for this layer.
- 2) Roads layer – This layer was assembled using road inventory GIS layers from the Alaska Division of Forestry northern southeast and southern southeast area offices, and the Tongass National Forest, supplemented with traffic information from the Alaska Department of Transportation.

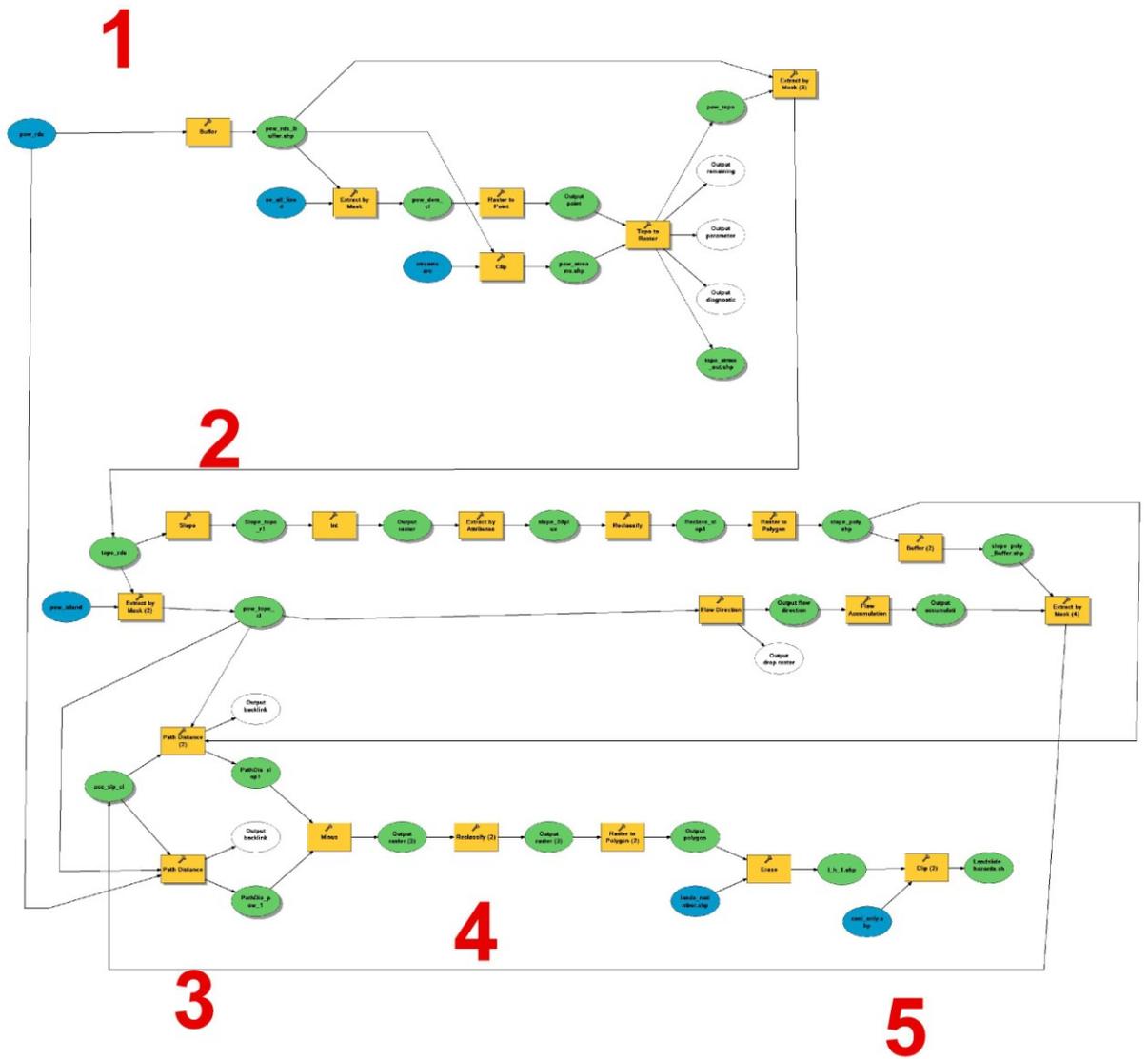
In the Tongass National Forest Roads inventory GIS layer, roads are categorized by management objective. Roads selected to meet an analysis criteria for Public Use Roads are those roads with an Objective Maintenance Level of 3 (suitable for passenger cars), 4 (moderate degree of user comfort), and 5 (high degree of user comfort). This results in the Analysis Roads GIS layer. In addition, portions of other roads with known public use were included:

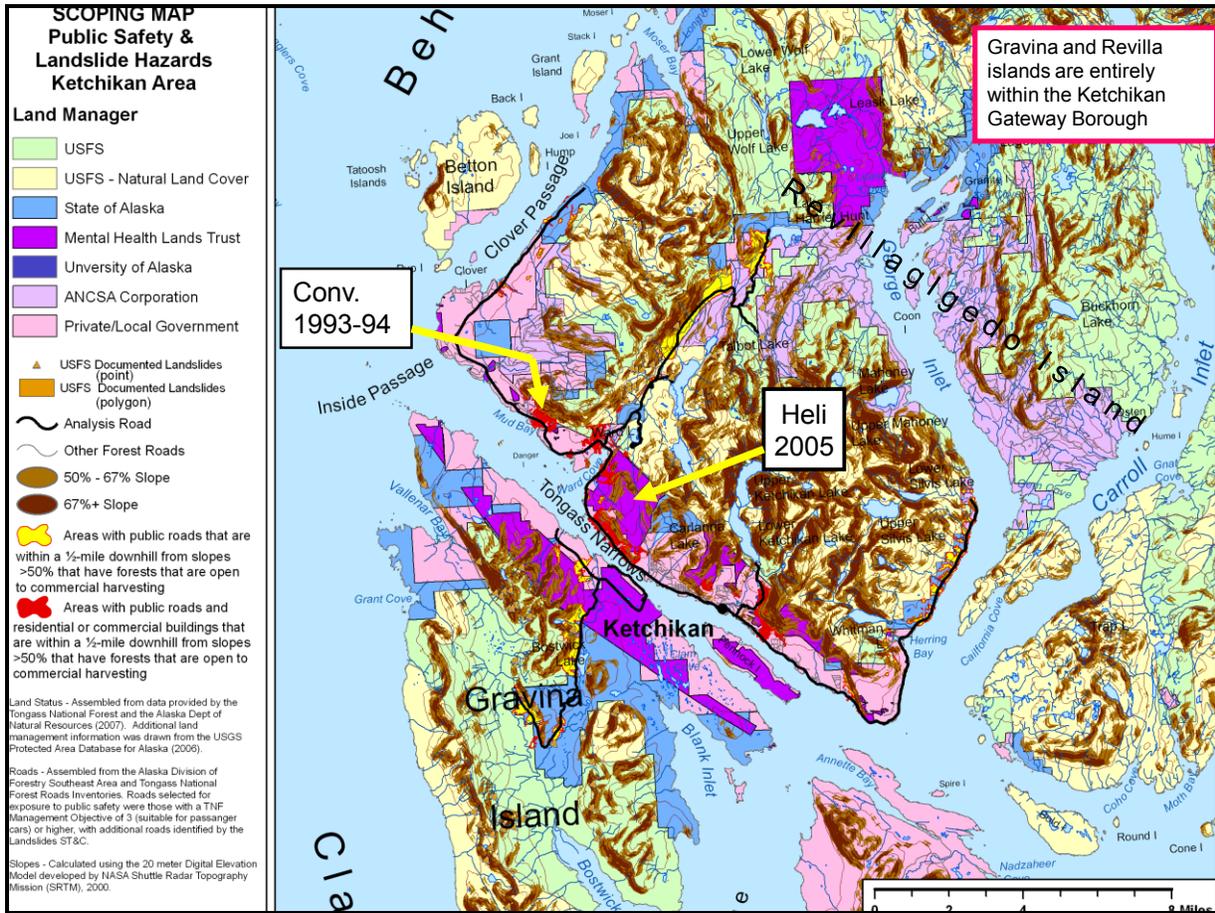
- A) Hyدابurg to Deer Bay on Prince of Wales Island.
 - B) Eastern Passage road on Wrangell Island.
 - C) Point Fredrick road on Mitkof Island.
 - D) Point Sophia road northeast of Hoonah on Chichagof Island.
 - E) Spasski Creek road east of Hoonah on Chichagof Island.
- 3) Digital Elevation Model – The digital elevation model used was obtained from the Alaska Division of Forestry northern southeast office. It originates from the NASA Shuttle Radar Topography Mission (SRTM) in February 2000 and has a resolution of 20 meters. The Cordova area analysis with conducted using the 60-meter National Elevation Database taken from the Alaska Dept of Natural Resources GIS server. Processing the DEM to define slopes of 50%+ and 67%+ produced the Analysis Slopes layer.
 - 4) National Land Cover Database, Alaska – The NLCD, Alaska was obtained from the USGS Alaska Field Office. Land Cover types “Evergreen Forest and “Mixed Forest” were selected to define areas of potential commercial forest stands. This results in the Forested Land Cover analysis layer.

Analysis Steps

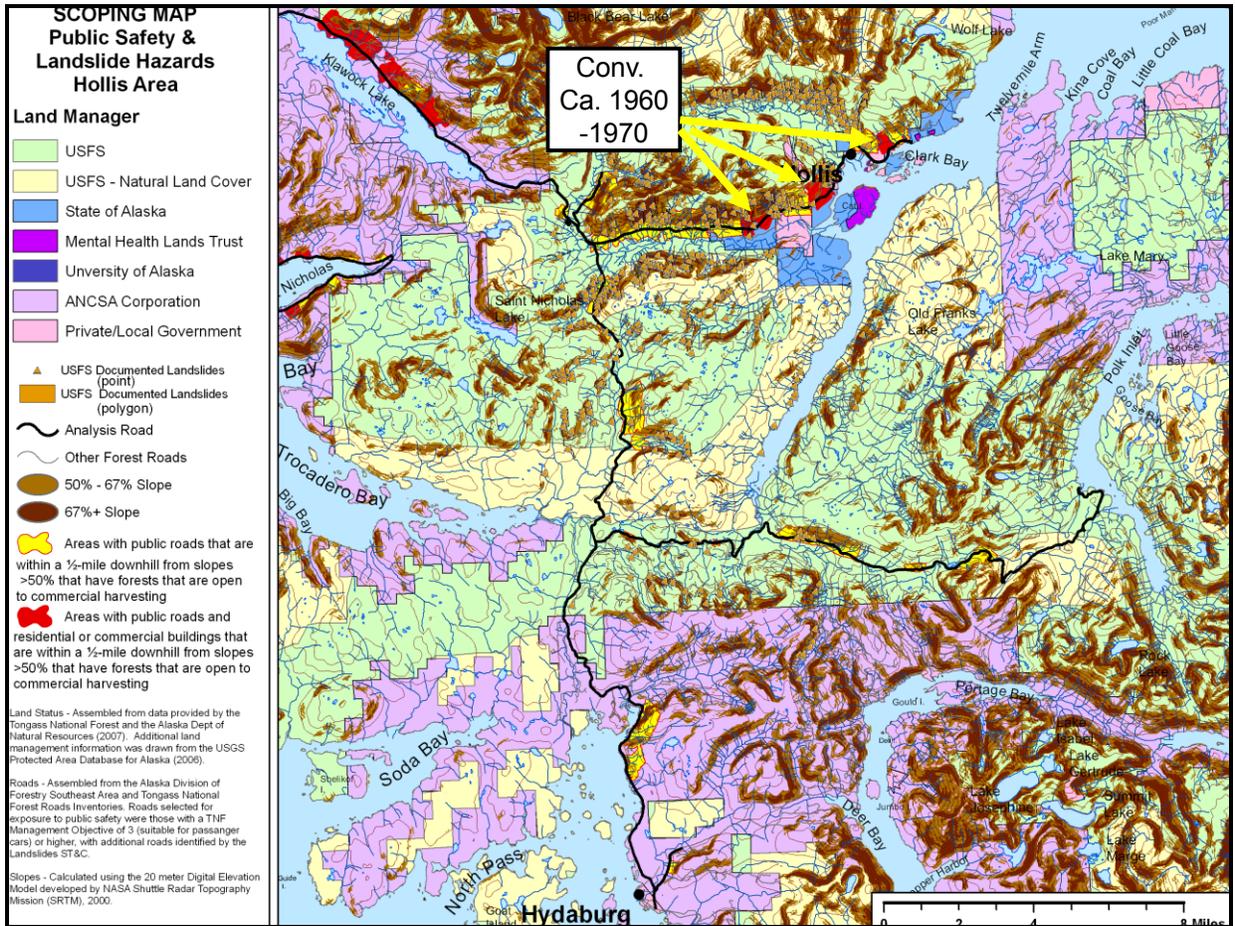
An ArcGIS 9.2 Workstation with the Spatial Analyst extension along with ArcMap 9.2 were used to for analysis and map production. In addition to the GIS layers identified above, map annotation was drawn from the Alaska DNR GIS server.

- 1) A buffer of 0.5 miles was produced using the Analysis Roads layer. This buffer was used to extract the portions of the DEM within 0.5 miles of the roads, which limits all resulting analysis to 0.5 mile from the Analysis Roads. The DEM was further processed to hydraulically enforce the DEM using the Tongass National Forest Streams GIS layer.
- 2) The resulting DEM was masked to limit DEM to on-shore areas, then processed to define 50% and 67% Analysis Slopes. This Analysis Slopes layer was buffered to 0.5 miles to limit further DEM analysis to 0.5 miles of Analysis Slopes, and resulting DEM was used calculate a Flow Accumulation surface of the 20 meter cells within the DEM from cells up slope.
- 3) The Flow Accumulation surface was used along with the DEM to calculate the Path Distance Weight (PWD) from the Analysis Roads and the Analysis Slopes.
- 4) The Analysis Roads PWD surface is subtracted from the Analysis Slopes PWD surface, and the resulting is reclassified to 255 classes, with the resulting values greater the 200 being considered potential landslide hazards. This resulting layer was further processed to identify islands of no hazard completely surrounded by areas of hazard, and those areas were included into a resulting potential Landslide Hazard Areas layer.
- 5) The potential Landslide Hazard Areas was masked with the No_Comm_Timber layer to exclude area managed for the preservation of natural land cover, and masked again to the Forest Land Cover layer to include only forested lands, resulting in the final Landslide & Public Roads Hazard Areas. These are showed as Red Areas on the maps.

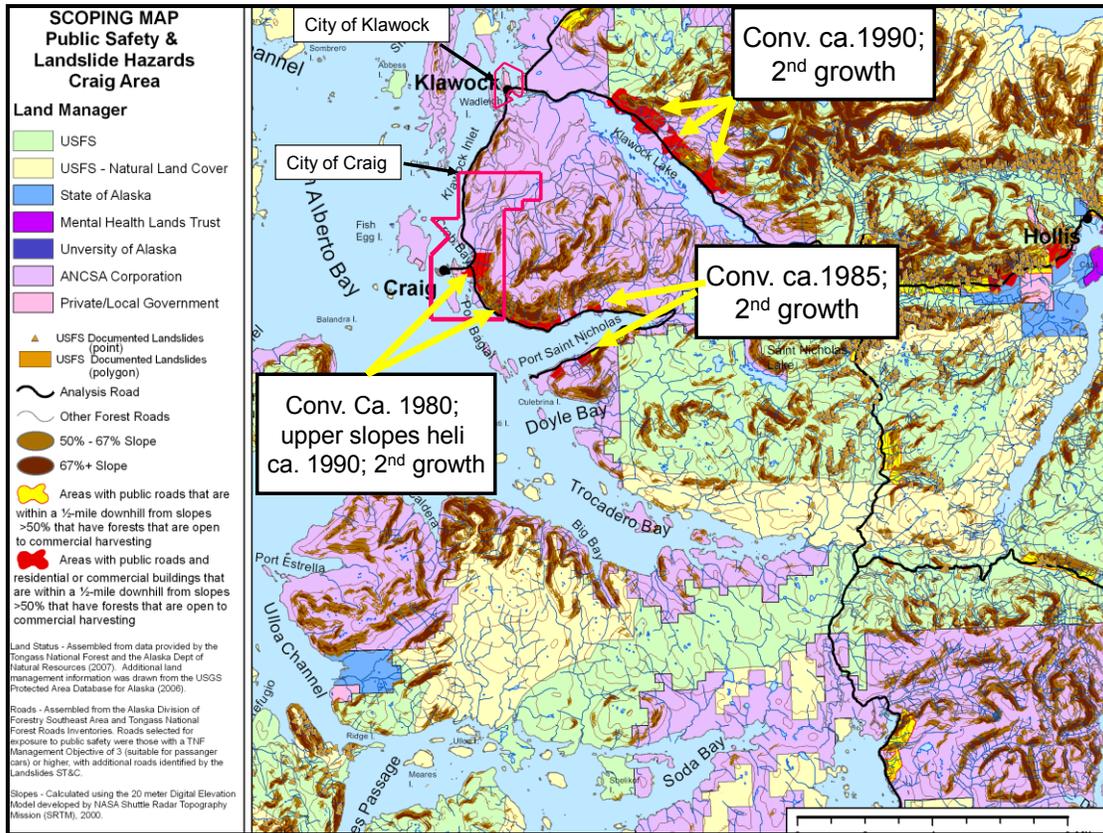




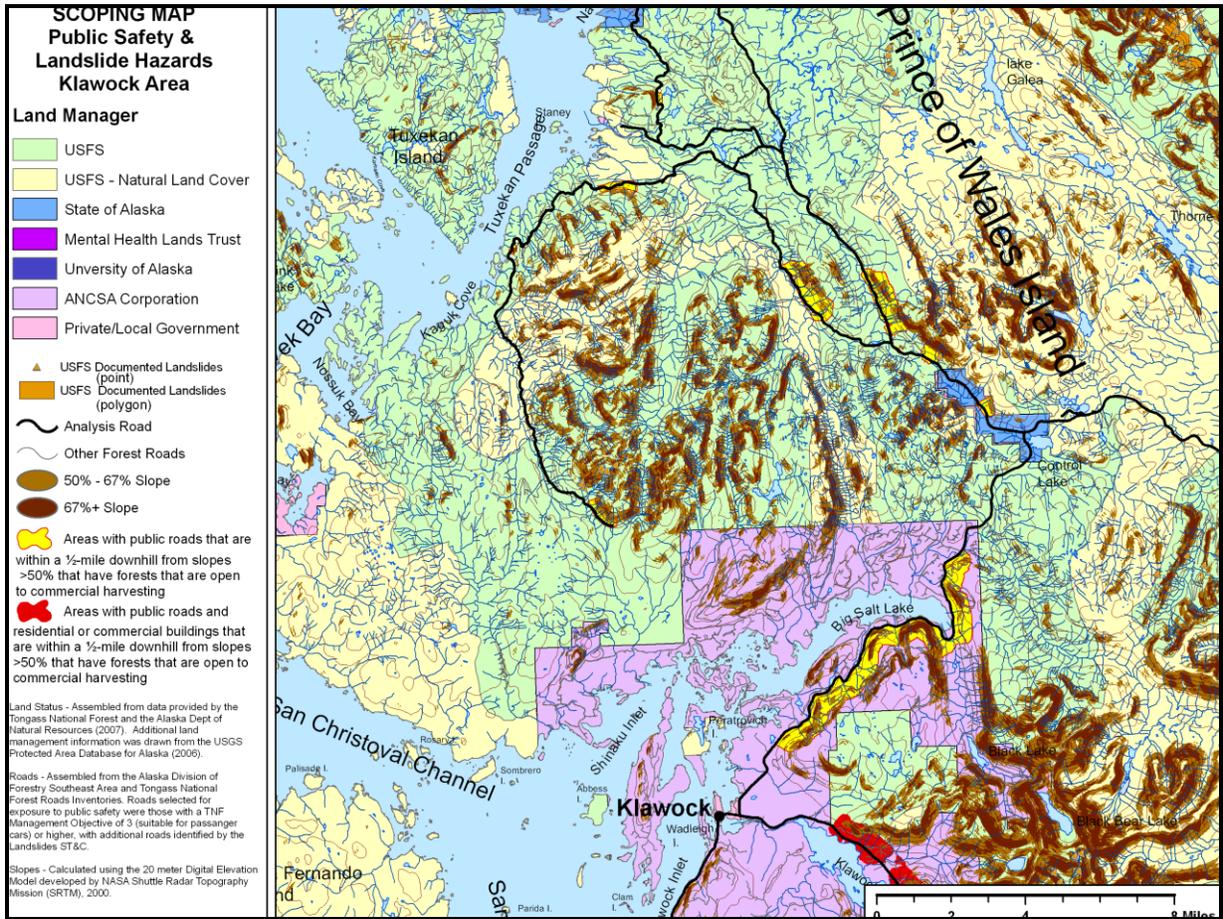
Map 1
Ketchikan Area



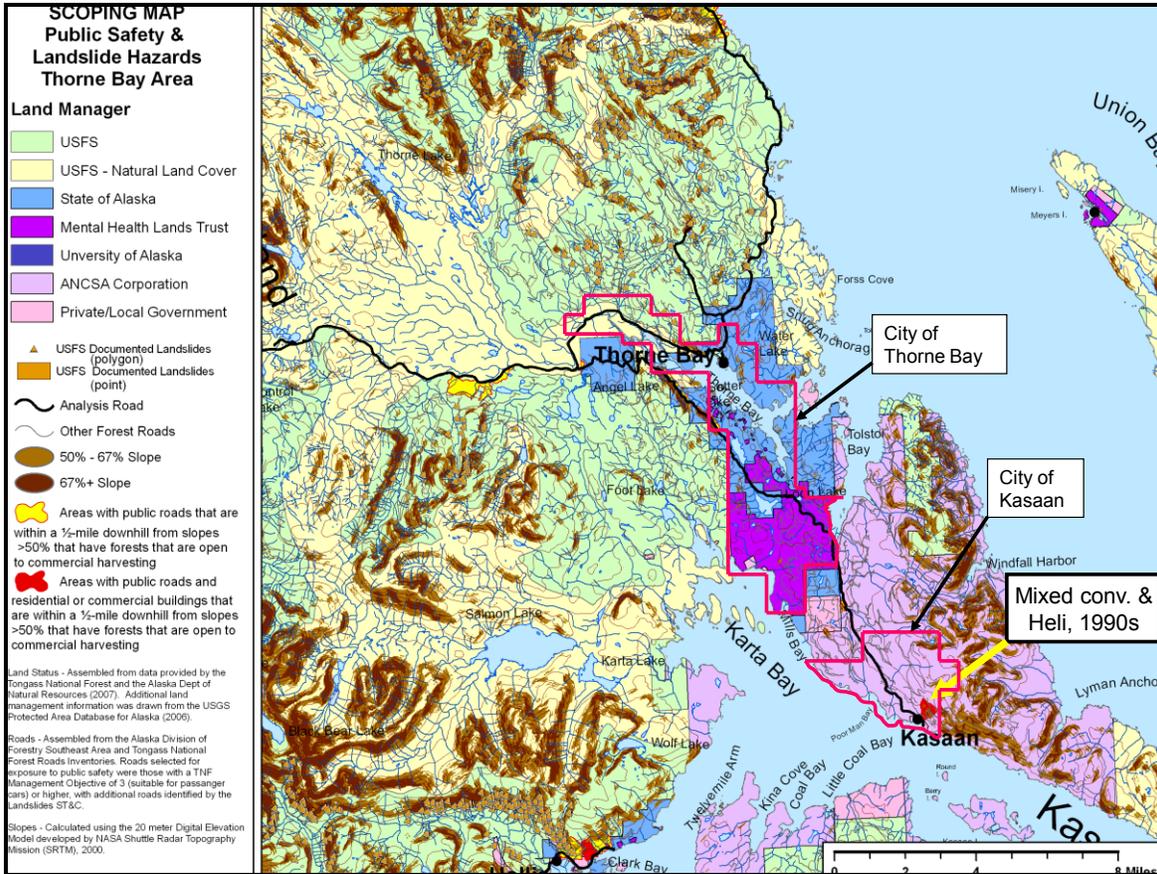
**Map 2
Hollis Area**



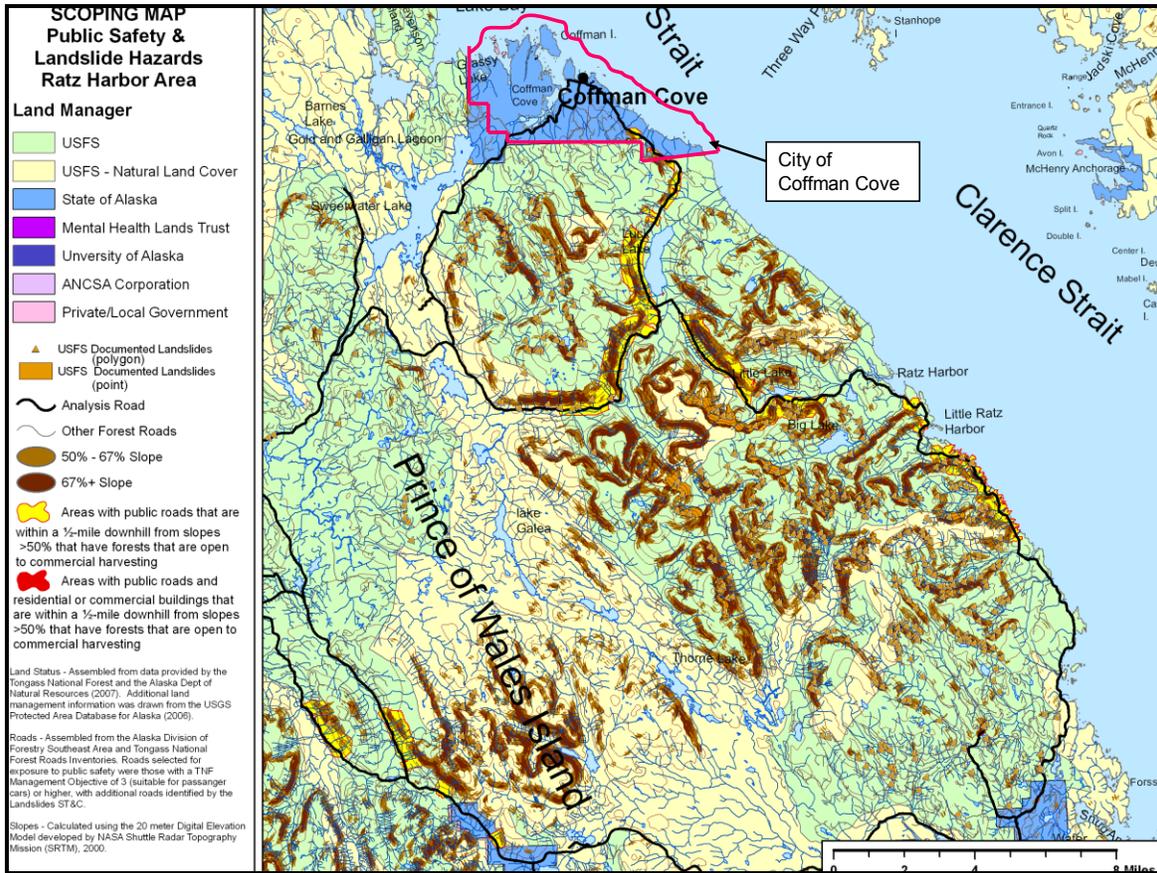
**Map 3
Craig Area**



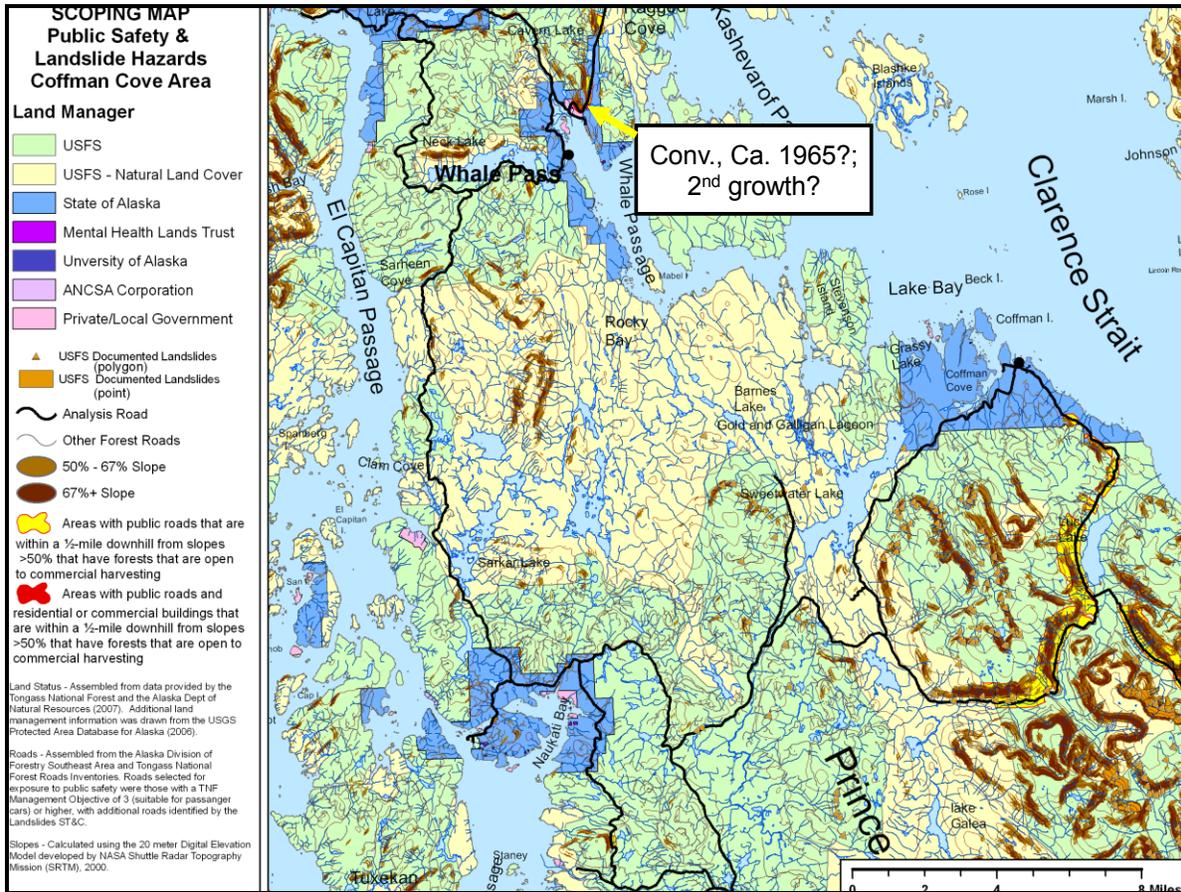
**Map 4
Klawock Area**



**Map 5
Thorne Bay Area**



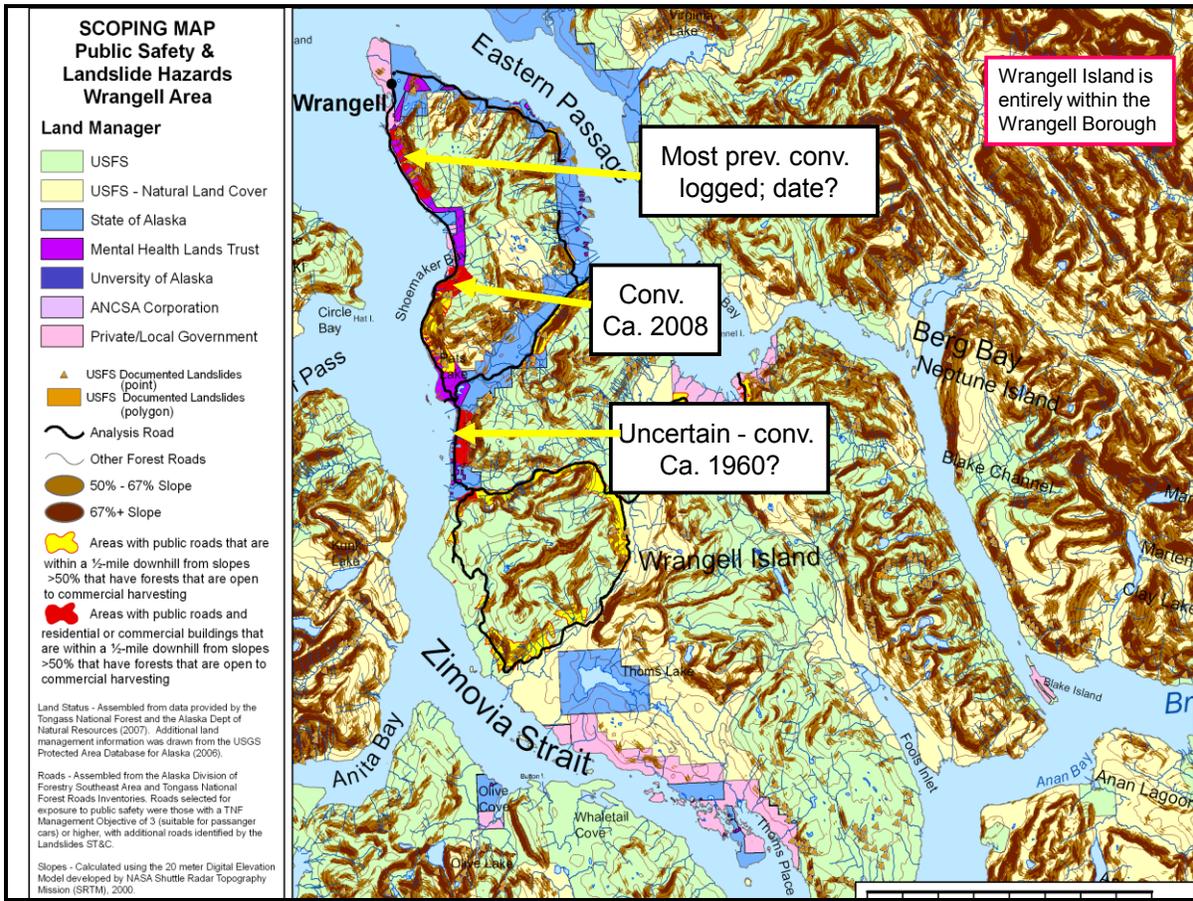
**Map 6
Ratz Harbor Area**



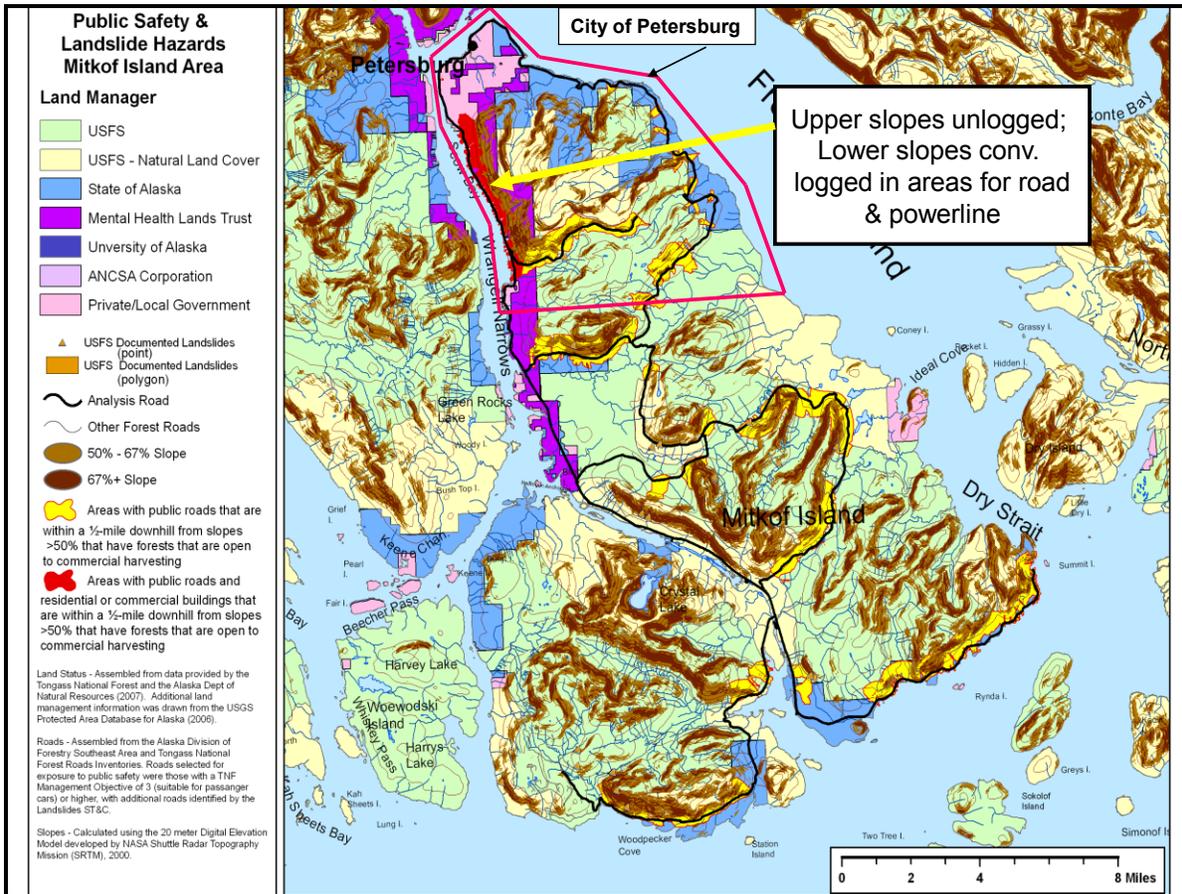
**Map 7
Coffman Cove Area**



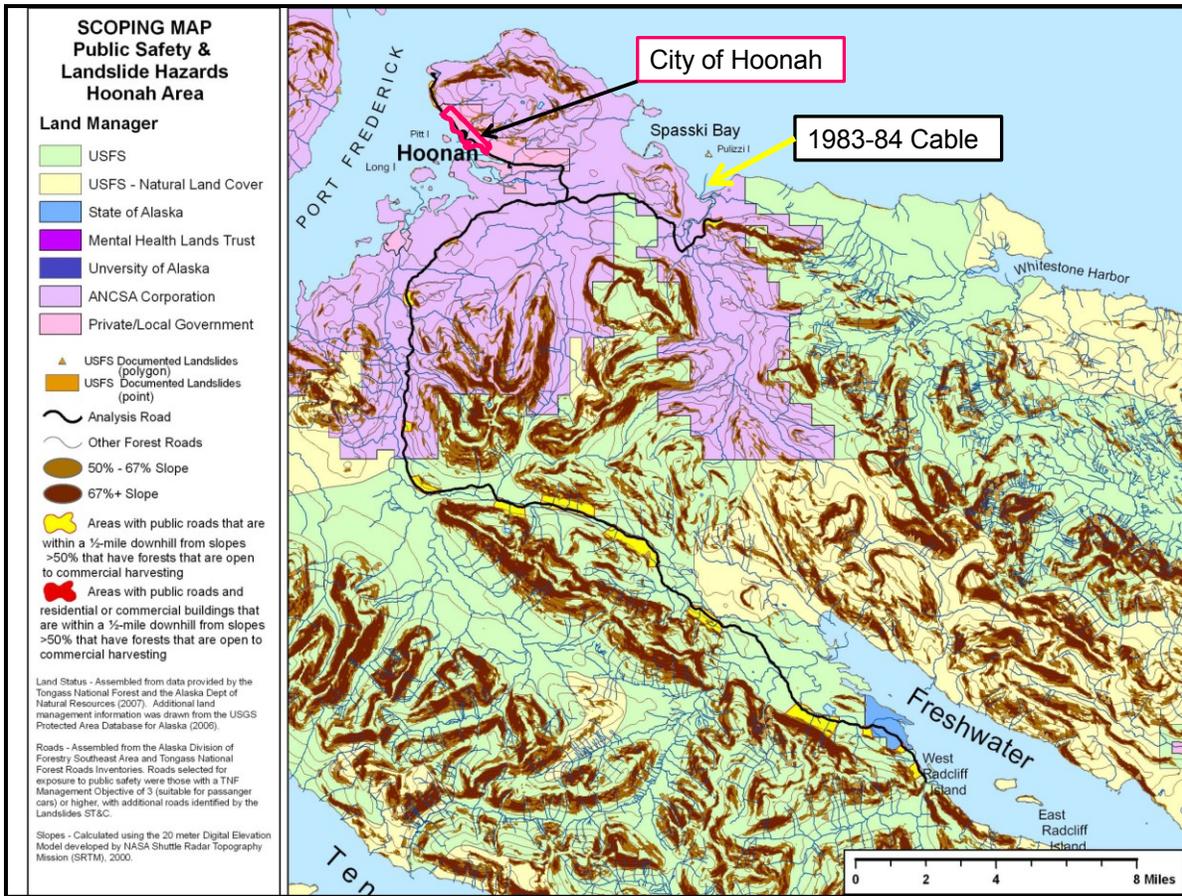
**Map 8
El Capitan Area**



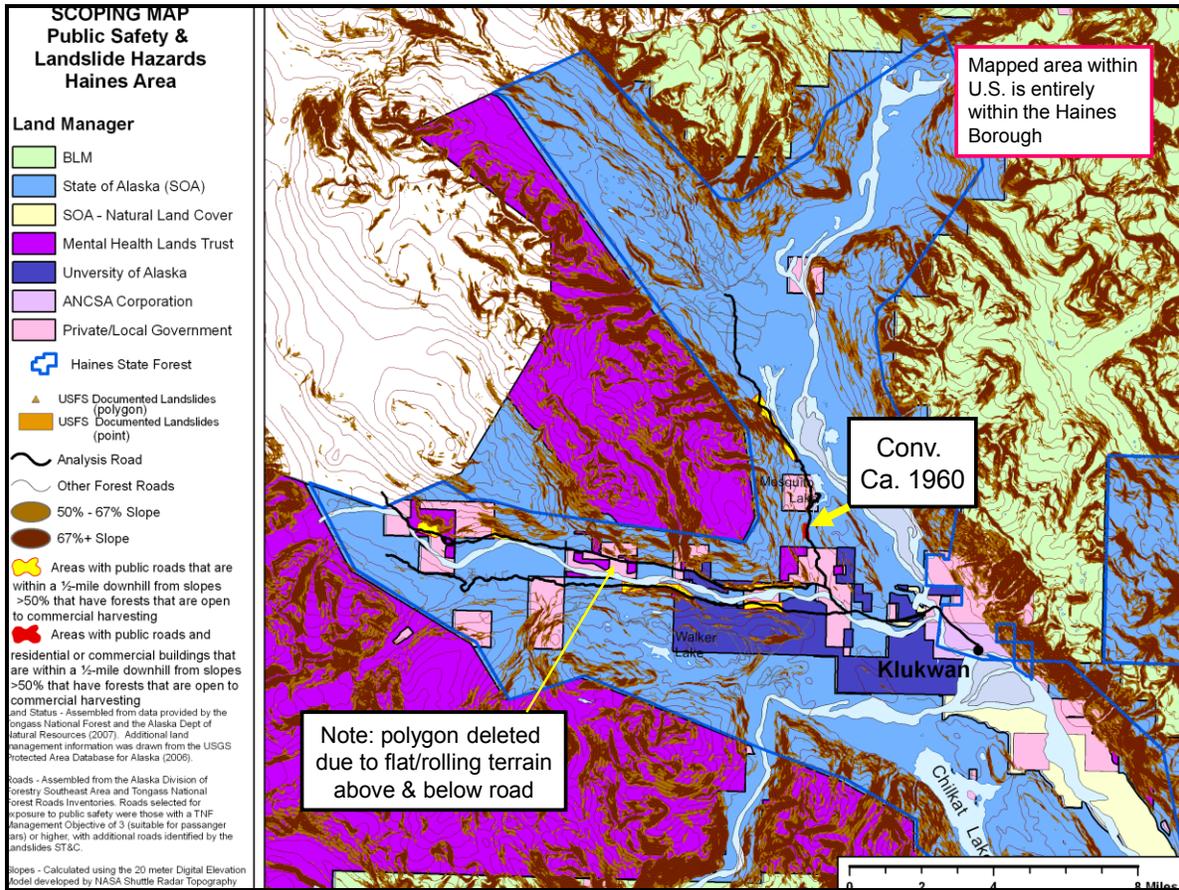
**Map 9
Wrangell Area**



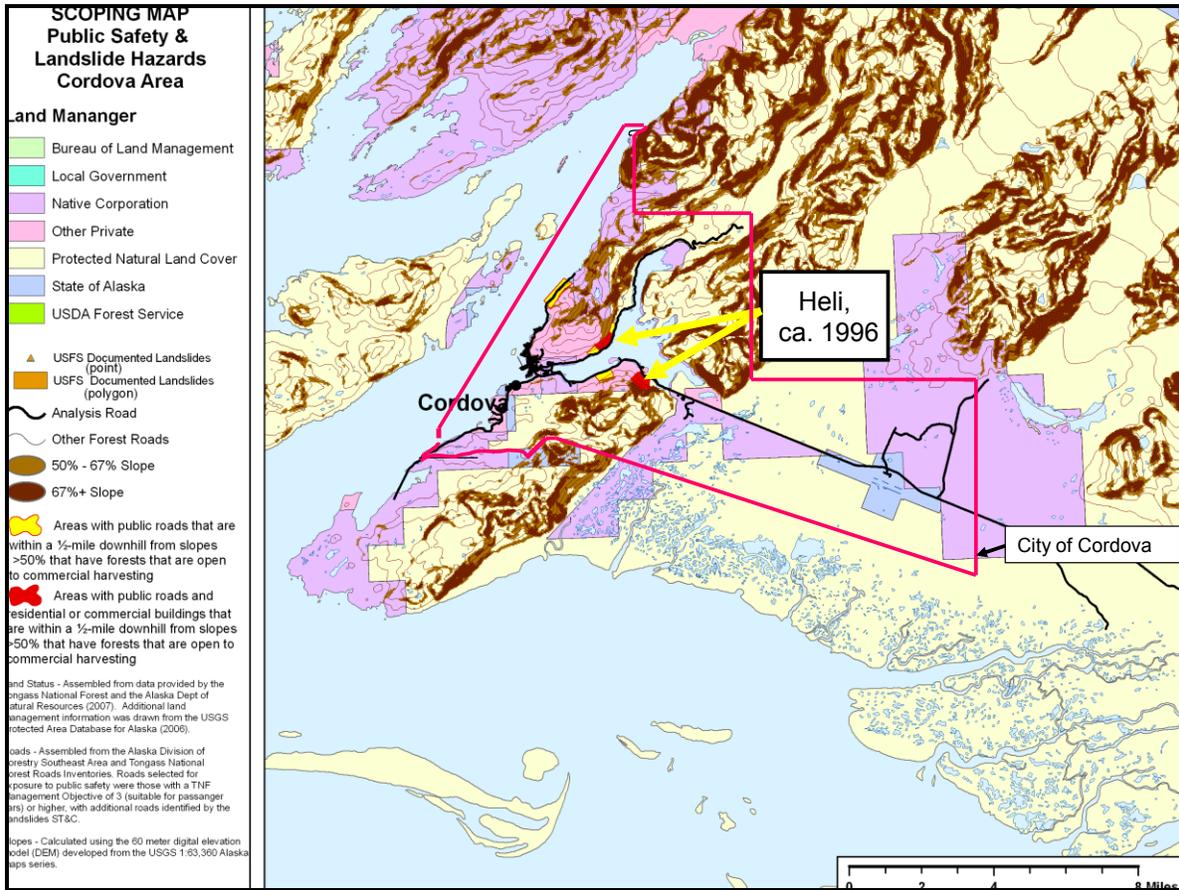
**Map 10
Mitkof Island Area**



**Map 11
Hoonah Area**



**Map 12
Haines Area**



**Map 13
Cordova Area**



Expertise	Name	Contact info	E-mail	Phone
DNR-DOF	Marty Freeman	DNR Division of Forestry 550 W. 7 th Avenue, Suite 1450 Anchorage, AK 99501	Marty.freeman@alaska.gov	276-3749
DNR-DOF	Greg Staunton	DNR Division of Forestry 2417 Tongass Avenue Suite 213 Ketchikan, Alaska 99901	greg.staunton@alaska.gov	225-3070
DNR-DOF	Pat Palkovic	DNR Division of Forestry 2417 Tongass Avenue Suite 213 Ketchikan, Alaska 99901	pat.palkovic@alaska.gov	225-3070
DEC-WQ	Kevin Hanley	DEC Division of Water 410 Willoughby Ste 303, PO Box 111800 Juneau, AK 99801-1800	Kevin.hanley@alaska.gov	465-5364
ADF&G-Habitat	Kyle Moselle	ADF&G Habitat Division PO Box 240020 Douglas, AK 99824-0020	Kyle.moselle@alaska.gov	465-4287
Hydrology	Adelaide Johnson	USFS PNW Forest Sciences Lab 2770 Sherwood Lane, Suite 2A Juneau, AK 99801-8545	Ajohnson03@fs.fed.us	586-8811 x257
Geology	Jim Baichtal	USFS-TNF Ketchikan SO P.O. Box 19001 Thorne Bay, AK 99911	jbaichtal@fs.fed.us	828-3248
Soil Science	Dennis Landwehr	USFS-TNF Ketchikan SO 648 Mission Street (Federal Building) Ketchikan, AK 99901-6591	dlandwehr@fs.fed.us	228-6309
Helicopter harvesting	Bert Burkhardt	Columbia Helicopters P.O. Box 7055 Ketchikan, AK 99901	bertb@colheli.com	225-7879 w 503-709- 0313 c

FRPA Phase 2 Landslide Science & Technical Committee (S&TC)
Final Consensus Points
December 13, 2010

C1. For the purposes of the FRPA and its regulations, define both “landslide” and “mass wasting” using the definition under 11 AAC 95.900 (44):
"mass wasting" means the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity.

C2. Change the terms “unstable slope” and “unstable or slide-prone slope” to “unstable slope or slide-prone area” wherever they appear in the regulations. [Note: this amends the term used in 11 AAC 95.220(a)(9)(A) and .290(d)(2).]

C3am. “**Unstable slope or slide-prone area**” means a slope or area, generally in excess of 50% gradient, where one or more of the following indicators may exist. Slide risk depends on the combination of factors at a given site.

- landslide scar initiation zones,
- jack-strawed trees,
- gullied or dissected slopes,
- a high-density of streams or zero-order basins (source basins for headwater streams), or
- evidence of soil creep.

The S&TC recognizes that slope dissection is a significant indicator of slide risk, but difficult to assess – closely spaced dissections are a red flag, as are few dissections that funnel to a common collecting area. The S&TC recommends that the procedures in Chatwin, et al., 1994 be referenced in assessing landslide risk. One rule of thumb for assessing frequency of dissection would be where dissections are so closely spaced that they preclude split-yarding. This distance is approximately equal to tree height.

The citation for Chatwin et al., 1994 is:

Chatwin, S. C., D. E. Howes, J. W. Schwab, and D. N. Swanston. 1994. A guide for management of landslide-prone terrain in the Pacific Northwest. 2nd ed. British Columbia Ministry of Forests and U.S. Forest Service. 218 pp.

C4. Leave the term “high risk of slope failure” in 11 AAC 95.280 (d)(1) unchanged.

C5am. Add the following term to the definitions in 11 AAC 95.950: “**Unstable fill material**” means organic debris, organic soil, or fine-textured mineral soils. A fine-textured soil has a texture of silty-clay, sandy-clay, or clay.

Change ,290(b)(2) as follows:

11 AAC 95.290. Road construction. [...]

“(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, unstable fill material may not⁵ be used [IF IT IS UNSTABLE, FINE TEXTURED, OR PRONE TO MASS WASTING] and cuts must be minimized where fine textured soils are known or encountered; “

C6. Add to **11 AAC 95.360 Cable yarding: [...]** (c) The following standards apply to cable yarding operations: [...]

(6) on unstable slopes or slide-prone areas, an operator shall minimize disturbance to soils, understory vegetation, stumps, and root systems. *Add to this section or to .340: In these areas, an operator should consider partial cuts, helicopter yarding, retention areas, or other techniques designed to meet these objectives.*

C7. Add to **11 AAC 95.365. Tracked and wheeled harvest systems:** (a) A person may not skid timber or operate construction equipment or machinery in a water body catalogued as anadromous under AS 16.05.871, without written approval of the Department of Fish and Game, or in any other surface waters, marshes, [OR]non-forested muskegs, or unstable slopes or slide-prone areas without prior notice to the division except, that equipment may be operated on frozen surface waters, marshes, or non-forested muskegs without prior notice to the division.

C8. Edit 11 AAC 95.290(b)(3) to prohibit blasting in saturated soil conditions:

“(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(3) may not conduct excavation and blasting activities during saturated soil conditions. [IF MASS WASTING IS LIKELY TO RESULT AND CAUSE DEGRADATION OF SURFACE OR STANDING WATER QUALITY.]

⁵ Per AGO, “may not” is the correct usage in this case; “shall” in the first line should be “must”.

C9am. With respect to blasting on steep or unstable slopes under 11 AAC 95.290(b)(3), the following indicators should be included to help operators determine when saturated soil conditions exist:

“Evidence of saturated soil conditions on a steep slope or unstable area may include:

- On cutslopes, noticeable soil liquefaction or movement of large soil particles to the ditchline
- Significant water flow evident on the surface, exposed bedrock, or impermeable hardpan
- Excavated or disturbed material performing in a liquid manner
- High rainfall rates in previous 24 hours, e.g., 6 inches in a 24-hour period, or prolonged periods of heavy rainfall
- Heavy rain following extended periods of freezing
- Heavy rain-on-snow events”

▶▶▶**Note:** *The S&TC did not reach consensus on recommendations for 11 AAC 95.290(d). See the minutes from meeting #3, November 23, for a discussion of this issue, and the options presented by the S&TC.*

C10. Training needs include,

- Identification and mapping for DPOs of “unstable slopes and slide-prone areas,”
 - information available from the scoping maps, digital elevation models, and other sources to identify and map these areas
 - All indicators listed under this definition
 - Which slopes <67% are unstable or slide-prone
- Identification of “saturated soils” and understanding of the indicators for saturation on slopes
- Assessment of likely runout zones for potential slides (e.g., see Chatwin et al., 1994 illustrations)
- Connection between FRPA standards and water quality standards, and sources of information on water uses
- Any changes adopted in regulation or made to the DPO form.

C11. Bibliography Additions. The following documents were added to the bibliography by consensus:

- Bash, J. C. Berman, and S. Bolton. 2001. Effects of turbidity and suspended solids on salmonids. Univ. of Washington Center for Streamside Studies. Washington State Dept. of Transportation Technical Report WA-RD 526.1. 74 pp.
- Benda, L., D. J. Miller, K. Andras, P. Bigelow, G. Reeves, and D. Michael. 2007. NetMap: A new tool in support of watershed science and resource management. *Forest Science* 52:206-219.
- Benda, L., D. Miller, S. Lanigan, and G. Reeves. 2009. Future of applied watershed science at regional scales. *EOS, Transaction American Geophysical Union* 90:156-157.
- Burnett, K.M., and D. Miller. 2007. Streamside policies for headwater channels: An example considering debris flows in the Oregon Coastal Province. *Forest Science* 53:239:253.
- Burnett, K., Torgerson, C.E., Steel, A.E., Larsen, D.P., Ebersole, J.L., Gresswell, R.E., Lawson, P.W., Miller, D.J., Rogers, J.D., Stevens, D.L. 2009. Data and modeling tools for assessing landscape influences on salmonid populations: Examples from Western Oregon. *American Fisheries Society Symposium* 70:873-900.
- Burnett, K.M., G. Reeves, D. Miller, S. Clarke, K. Vance-Borland, and K. Christiaansen. 2007. Distribution of salmon-habitat potential relative to landscape characteristics and implications for conservation. *Ecological Applications* 17:66-80.
- Chatwin, S.C., and R.B. Smith. 1992. Reducing soil erosion associated with forestry operations through integrated research: an example from coastal British Columbia. In *Erosion, debris flows, and environment in mountain regions, proc. of the Chengdu Symp.* IAHS Publ. no. 209
- Chatwin, S. C. 1994. Measures for Control and management of unstable terrain. Pp. 92-105 in *A guide for management of landslide-prone terrain in the Pacific Northwest*. 2nd ed. Land management handbook #18. B.C. Ministry of Forests
- Clarke, S. E., K. M. Burnett, and D. J. Miller. 2008. Modeling streams and hydrogeomorphic attributes in Oregon from digital and field data. *Journal of the American Water Resources Association* 44(2):1-20.
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- Landwehr, D. J. and G. Nowacki. 1999. Summary of statistical review of Ketchikan Area soil disturbance. Unpubl.
- Martin, D.J., and J.A. Kirtland. 1995. An assessment of fish habitat and channel conditions in streams affected by debris flows at Hobart Bay. Project 16-004 report written by Pentec

Environmental, Inc., Edmonds, Washington. Written for Goldbelt, Inc., Juneau, Alaska. 40pp. plus Appendix.

- Megahan, W.F., and J.G. King. 2004. Erosion, sedimentation, and cumulative effects in the northern Rocky Mountains. Pp. 201-22 in A century of forest and wildland watershed lessons. G.G.Ice and J.D.Stednick, eds. SAF, Bethesda, MD
- Reeves, G.H., L.E. Benda, K.M. Burnett, P.A. Bisson, J.R. Sedell. 1995. A disturbance-based ecosystem approach to maintaining and restoring freshwater habitats of evolutionarily significant units of anadromous salmonids in the Pacific Northwest. American Fisheries Society Symposium 17:334-339.
- Roberts, B., B. Ward, and T. Rollerson. 2004. A comparison of landslide rates following helicopter and conventional cable-based clear-cut logging operations in the Southwest Coast Mountains of British Columbia. *Geomorphology* 61: 337-346
- Schmidt, K.M., J.J. Roering, J.D. Stock, W.E. Dietrich, D.R. Montgomery, and T. Schaub. 2001. The variability of root cohesion as an influence on shallow landslide susceptibility in the Oregon Coast Range
- Sidle, R.C., A.J. Pearch, and C.L. O’Laughlin. 1985. Hillslope stability and land use. Chapte 5: Effects of land management on soil mass movement. American Geophysical Union, Water Resources Monograph 11. (*Excerpt*)
- Washington State Dept. of Natural Resources. 1997. Watershed analysis manual. Appendix A. Mass Wasting. Pp. A-1 to A-48.

MINUTES OF SCIENCE & TECHNICAL COMMITTEE MEETINGS PHASE 2 - REVIEW OF BEST MANAGEMENT PRACTICES

Minutes

FRPA Phase 2 Landslide Science & Technical Committee (S&TC) Meeting #1 - September 2, 2010 DEC Conference Room, Juneau

S&TC Attendees: Bert Burkhart, Marty Freeman, Kevin Hanley, Adelaide (Di) Johnson, Dennis Landwehr, Kyle Moselle, Pat Palkovic, and Greg Staunton. Jim Baichtal was absent.

Public visitors: Brian Kleinhenz (Sealaska), Ron Wolfe (p.m. only, Sealaska)

INTRODUCTION

Freeman reviewed the agenda, and introductory handouts covering the purpose and organization of the S&TC, the background of the landslide issues under the Forest Resources and Practices Act (FRPA), and the results of the scoping process for these issues. Products from the scoping process (Phase 1) include consensus points from the S&TC, the bibliography, draft definitions, and scoping maps with acreage summaries.

The purpose of the Phase 2 S&TC is to review, and where appropriate, recommend updates to the FRPA best management practices for landslides and mass wasting associated with forest operations, including

- Definitions for key terms, including,
 - “landslide”
 - “mass wasting”
 - “unstable or slide-prone slope”,
 - “slope that has a high risk of slope failure”, and
 - “fill material prone to mass wasting”.
- BMPs for harvesting and yarding methods in unstable or slide-prone areas, including helicopter operations and partial harvesting.

Burkhart commented that the current FRPA best management practices (BMPs) are OK. Moselle agreed, but said that definitions are needed. For example, “unstable or slide-prone slope” should be defined so that operators know where the associated BMPs apply. Definitions are needed for clarity. Burkhart agreed, and noted that sometimes more people need to be involved at particular sites.

Moselle noted that some information required in a Detailed Plan of Operations (DPO) is not clearly required in a Forest Land Use Plan (FLUP) for an operation on state land.

Moselle asked whether the S&TC committee members include people with forest engineering expertise. Freeman replied that Staunton and Burkhart bring engineering expertise to the committee.

Johnson said that the issues come down to risk – there’s always risk associated with logging. The initial discussions were about public safety, but now they are not. Do the current BMPs reduce risk enough? That’s the question.

Moselle noted that the Board decision to not request FRPA authority for regulations concerning public safety puts some sideboards on the discussion. The direction to focus on existing authorities for fish habitat and water quality may cause some frustration. Some areas with slide hazards don’t have streams according to the input from the Mitkof Highway Homeowners Association. Hanley commented that there were streams in the Mitkof Highway area, but they weren’t all anadromous. Freeman and others noted that the slope stability BMPs under 11 AAC 95.280 apply to anadromous streams and their tributaries, but the other BMPs do apply to all surface waters.

Hanley also noted that 11 AAC 95.290 (b)(3) prohibits excavation and blasting during saturated soil conditions if mass wasting is likely to result and cause degradation of surface or standing water quality. However, some landslides may impair productivity without degrading water quality. The Act (AS 41.17.060(c)(5)) prohibits significant impairment of productivity of the land on state and municipal forest land.

Johnson commented that with regard to fish, landslides both create and destroy habitat, and slides occur naturally at some frequency. However, with regard to humans, landslides only destroy habitat. Fish habitat is provided by a combination of sediments and wood, and large woody debris comes from bank erosion and mass wasting. In streams where fish habitat is sediment-limited, slides can enhance the habitat. Moselle said it's like fires in a fire-adapted ecosystems – fire suppression can cause problems, and the same is true with slides.

Hanley said that he understands the sediment and wood needs in streams, but if you are talking about a natural system with landslides, the analogy doesn't hold. Moselle replied that at some sites, construction is managed to hold slopes in place that otherwise would have slid, for example along a road above a stream. That can actually decrease stream sediments. Palkovic noted that on a small scale, culverts can do the same thing.

Staunton said that the timeframe is important – are we considering a geologic time scale, or the human time frame in which logging occurs and the slide appears to be linked to the logging activity. Logging can accelerate the natural landslide process. The question is whether we can tolerate the impacts of accelerated landslide activity.

Landwehr commented that logging also removes potential large woody debris sources – that why landslides from clearcut areas are smaller on average than those from uncut areas. Kleinhenz stated that the 66' FRPA riparian buffers are designed for large woody debris recruitment.

Johnson recommended that the scoping maps be provided to public agencies that do deal with public safety, including the municipalities, Division of Forestry, and others. Freeman suggesting posting them on the DOF website and notifying agencies, landowners, and organizations and individuals on the public mailing list for S&TC information that they are available.

BIBLIOGRAPHY

Freeman handed out a summary chart of 11 references related to landslides and either helicopter harvesting or partial harvesting, and copies of the references (*see handout list at end of minutes*). Johnson identified the reference from Megahan and King, 2004, which Freeman added to the bibliography, and the reference from Roberts, et al., 2004. The Roberts reference was already in the bibliography, but Freeman starred because it is a frequently cited reference on helicopter harvesting and landslides. Freeman asked for S&TC input on the 11 references and whether any should be added to the bibliography, and whether any should be starred as key references, or have a star removed.

Landwehr suggested that an additional paper by Nowacki and Landwehr be included. It documents that full suspension logging causes less disturbance than partial suspension in the Tongass. Landwehr will provide a copy to Freeman.

DEFINITIONS

Moselle asked about the source of the draft definitions from the Phase 1 process. Landwehr developed them. The draft definitions of “landslide” and “mass wasting” are the same as those in the Tongass Land Management Plan.

Landslide: The moderately rapid to rapid downslope movement of soil and rock materials that may or may not be water saturated.

Mass Wasting: A general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another. Also Mass Movement. Moselle commented that he doesn't like the phrase "moderately rapid to rapid". The definition needs a time scale, something faster than soil creep. Something he can't outrun. Landwehr responded that this phrase is a general term that is used elsewhere. It includes earthflows down south which you could outrun. Freeman noted that the FRPA regulations have a definition for "mass wasting" – "the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity." (11 AAC 95.900 (44)) Following the discussion, the S&TC recommend using the FRPA definition for both "landslide" and "mass wasting."

C1. For the purposes of the FRPA and its regulations, define both "landslide" and "mass wasting" using the definition under 11 AAC 95.900 (44):
"mass wasting" means the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity.

[Note: the current Act and regulations use the term "slide-prone" but use "mass wasting" rather than "landslide."]

"Unstable or slide-prone slope". In the scoping process, the S&TC used the following draft definition:

Unstable or Slide Prone Slope: A slope where landslide scar initiation zone(s) exist, or where jack-strawed trees, frequently dissected slopes, a high density of Class 4 and zero order basins, or soil creep are common. Consider especially areas where these features occur on slopes greater than 50 percent.

Hanley noted that the regulations use variations on this term in different places, including "unstable slope" (11 AAC 95.290(d)), "unstable or slide-prone slope" (11 AAC 95.220(a)(9)), and "unstable slope or slide-prone area." Staunton said that "slide-prone area" makes more sense. That leaves the interpretation up to expertise.

The S&TC agreed that the term should be standardized to "unstable slope or slide-prone area."

C2. Change the terms "unstable slope" and "unstable or slide-prone slope" to "unstable slope or slide-prone area" wherever they appear in the regulations. [Note: this amends the term used in 11 AAC 95.220(a)(9)(A) and .290(d)(2).]

Staunton noted that the draft definition relies on terms that require other definitions, including "Class 4 streams" and "zero-order basins."

Moselle said that the draft definition is not a perfect match with FRPA. Type D streams are not water quality streams. Palkovic explained that all surface waters are water quality streams, but not all surface waters are classified as Type I-A, I-B, I-C, or I-D.

Landwehr asked whether intermittent streams are considered surface waters. Hanley said they are covered if they are tributaries to anadromous waters. Palkovic clarified that small non-fish-bearing streams that empty directly to the ocean are surface waters, but not "classified streams."

Staunton suggested replacing "zero-order basins" and "Class 4" streams with "surface waters." Johnson replied that they are not the same. Zero order basins are depressions where subsurface flows converge and remain subsurface except in high rain periods. Sometimes it is hard to even detect a zero-order basin in deep soils. Landwehr suggested putting "Class 4 streams" and "zero order basins" into FRPA terms. Hanley suggested changing "Class 4" to "streams" and "zero-order" to "headwater." Johnson replied that a zero-order basin is frequently soil where subsurface water converges that is above the headwater stream but below the ridge.

Burkhart observed that zero-order basins occur every several hundred feet in Southeast Alaska. If you walk down from them you'll find water. Staunton noted that zero-order basins are beyond what FRPA defines as streams. Johnson replied that all places with zero-order basins are risks. Landwehr concurred

that where there is a zero-order basin there's some risk. It's a matter of the level of risk. Moselle said that including areas with a high density of these basins is appropriate.

Staunton noted that the definition already focuses on areas with >50% slopes, and any zero-order basin should be considered on those slopes. Moselle said he didn't think a single zero-order basin makes the area a risk – it's the high density that speaks to the underlying hydrology. Landwehr commented that it depends on the scale – is this a broad area or a specific site? It is hard for operators to identify just a single zero-order basin.

Landwehr and Johnson commented that the risk varies depending on the downstream resources – are there people, oyster farms, fishing, other resources? Johnson said that we need to consider initiation and runout zones to assess downstream risks.

Landwehr reiterated that downslope risk is important. If the harvest is a helicopter operation or partial cut, he would recommend just leaving a clump of trees at the head of the area of concern.

Staunton said that financial liability is one type of risk. FRPA specifically addresses risks to water quality and fish habitat. If we do our job, we will probably resolve financial liabilities, too. If not, that issue will be fought out in another arena.

Kleinhenz said that the suggested language is just guidance. Listing things for the operator to look for is useful.

Palkovic noted that some of the BMPs don't even require a specific downslope resource risk to determine whether or not application of the BMP is required. She also observed that the definition doesn't automatically require an area to be mapped as unstable.

Hanley said that the larger point is the ability of agencies to adequately review instability. Unstable areas are rarely mapped on the DPOs, except for those prepared by Sealaska. Palkovic said the DPO usually do show known slides.

Kleinhenz asked about the use of 50% as the threshold for steep slopes rather than 67%. Freeman explained that during the scoping process the S&TC initially used 67% for mapping, but found many areas with known landslides were missed. When remapped using >50% slopes, most known landslide areas were captured. The literature also documents that many slides occur on slopes <67%. Johnson noted that research found that slopes >67% only accounted for about half of known slope failures, whereas slopes >50% account for about 90% of the known slides.

Kleinhenz stated that he preferred the 67% threshold. Freeman explained that in this process, the BOF asks the S&TC to provide their best scientific and technical recommendations. Those recommendations will subsequently be reviewed by the Board and an implementation group that includes affected parties, including landowners. At this point we want scientific and technical recommendations based on the best available information.

Moselle noted that the regulations refer to both “slopes >67%” and “unstable or slide-prone slopes”, so they're not assumed to be the same thing.

Palkovic asked for clarification on the term “frequently dissected slopes.” Landwehr said that those slopes are defined in terms of the number of channels per lineal slope mile. “Frequently dissected slopes” are a category in the Tongass National Forest landform handbook.

In response to a question, Landwehr said that pistol-butting on trees is not a good indicator of slope instability. Pistol-butting may result from other causes.

Staunton and Burkhart commented that jack-strawed trees are widespread, and for identifying unstable sites, only those areas where jack-strawing is not the result of windthrow are applicable.

S&TC discussed whether the list of descriptive characteristics in the definition should use “and” to indicate that all the characteristics should be present for the site to qualify as “unstable or slide-prone”, or whether a subset of the characteristics is sufficient, and the list should use “or.” The committee agreed that the list should use “or” – not all characteristics must be present at each site.

A question was raised about how the definition will affect other FRPA regions. Freeman said that due to the slope angles cited, it has little effect on harvest areas in the other regions.

The S&TC agreed on the following definition.

C3. Add the following term to the definitions in 11 AAC 95.950: “Unstable slope or slide-prone area” means a slope or area, generally in excess of 50% gradient, where one or more of the following indicators may exist.

- landslide scar initiation zones,
- jack-strawed trees,
- frequently dissected slopes,
- a high-density of streams or zero-order basins (source basins for headwater streams), or
- evidence of soil creep.

“High risk of slope failure.” This term is used in one slope stability BMP under 11 AAC 95.280(d)(1): “Avoid constructing a road that will undercut the toe of a slope that has a *high risk of slope failure*.” Palkovic asked whether “slope failure” includes rotational failures. Landwehr said it does include them. Landwehr asked whether the BMPs are trying to prevent slumps – is that covered with other erosion BMPs?

One suggestion was to change “high risk of slope failure” to “slide-prone area” in 11 AAC 95.280(d)(1). Palkovic responded that such a change would not cover blue-clay areas that are at risk for slope failure. Staunton replied that the .280(d)(1) BMP is in the slope stability section which covers areas with fish habitat and water quality concerns. There’s already a higher bar for operations in these area, so he would be comfortable using the “unstable slope” definition. Palkovic expressed concern that using “unstable slope” would eliminate some options to address some smaller-scale problems.

Staunton commented that FRPA training emphasizes the need for extra care around fish creeks. We are compelled to deal with fish habitat and water quality under this section.

Landwehr suggested changing “high-risk” to “slide-prone”. The concerns about blue-clay areas would already be covered by the reference to fine-textured soils in the definition.

The committee had split preferences on whether to leave the BMP as is with no additional definition of “high-risk” or to change the language to use the term “unstable slope”. Burkhart said that risk for operators increases with too many prescriptive requirements in regulation.

The committee recognized Palkovic’s concern that changing the language to “unstable slope” would reduce the ability to address some smaller features on the ground. If necessary, this section can be revisited after the S&TC finishes reviewing the rest of the BMPs.

C4. Leave the term “high risk of slope failure” in 11 AAC 95.280 (d)(1) unchanged.

“Fill material prone to mass wasting.” This term is used in the road construction BMP under 11 AAC 95.290(b)(2):

“(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, *fill material* may not be used if it is unstable, fine textured, or *prone to mass wasting*, and cuts must be minimized where fine textured soils are known or encountered.”

Moselle asked about the use of hog fuel and other material as road ballast. One member replied that it generally shouldn’t be used on steep or unstable slopes. Staunton replied that use of that material is not even practical unless the road is close to a mill. Moselle said that it could occur if a tow-behind chipper is used. Landwehr reported that wood waste markets change and sometimes operators are willing to haul wood waste to dispose of it.

Landwehr noted that fine-textured soils are not usually found on steep slopes.

The committee recommended dropping the terms “fine-textured, or prone to mass wasting”, leaving just the term “unstable” with respect to allowable fill, and defining “unstable fill” as follows.

C5. Add the following term to the definitions in 11 AAC 95.950: “**Unstable fill material**” means organic debris, organic soil, or fine-textured mineral soils. A fine-textured soil has a texture of silty-clay, sandy-clay, or clay. Organic soil contains more than 20% carbon.

“**Significant.**” Landwehr said that a definition of “significant” is needed. It is used in multiple BMPs and in the Act. Moselle commented that “significant” is a determination rather than a definition. It is more important under FRPA to know who makes the determination of significance than to define it. Palkovic noted that the Act defines “significant impairment of the productivity of the land and water” as “an activity that may foreseeably result in prolonged or substantial damage to renewable resources or prolonged or substantial reduction of the continuing capability of the land or water to produce renewable resources at their natural or historic levels.” (AS 41.17.950 (24))

Freeman said that this term had a lot of discussion during the development of the FRPA in 1989-90. The “Green Book” that documents that process may have relevant information, and she suggested deferring discussion of that term until she could research that information. Some of the discussion addressed the relationship of this term to coastal management as well.

“**Likely to occur or result.**” Hanley noted that the terms “likely to occur” or “likely to result” are used in the BMPs [e.g., 11 AAC 95.290 (b)(3) and (d); .365 (d) and (h)]. Unless it is obvious, only a qualified professional soil scientist is qualified to make the decision on whether mass wasting is “likely to result.” Who should make that decision? Currently it is the state agencies during field inspections.

BEST MANAGEMENT PRACTICES

Freeman reviewed the existing BMPs that address mass wasting and slope stability. (*See handout, “White Paper”*) Other BMPs that address erosion prevention also may affect mass wasting. She noted the Act and regulations provide general authority that might be used to require special practices in slide-prone areas (e.g., AS 41.17.060(b)(5) and 11 AAC 95.340), but do not specifically address harvesting practices that may be applicable, such as helicopter yarding or partial harvesting.

Moselle commented that the literature talks about the role of understory vegetation and canopy retention in maintaining slope stability.

Landslide information and DPOs. Staunton said that the choice and design of harvesting systems is usually left up to the operator. Agency comments focus more on road construction and design. Palkovic added that concerns about water quality impacts are usually the impetus for agency responses on items like landings. Staunton agreed – water quality is the main issue in DPO reviews rather than directly losing a hill to a slide. If the agency disagrees with an operator on whether a slide is likely to occur it needs to be obvious in a technical sense to be upheld in a stop work order or directive, otherwise the options are to fine the operator based on not following BMPs afterwards.

Hanley said that there are practices that can decrease ground disturbance, such as maximizing deflection by using lift trees and lighter turns. Staunton commented that operators are usually aware of the situation. With poor deflection, they have poor production, which takes care of itself before it becomes an issue. The exception may be new or small operators with less experience. Hanley said he had observed “downhill furrow yarding” at Lyman Anchorage.

Hanley said that he sees little information in DPOs that identifies unstable slopes. Freeman asked why that occurs – it is due to lack of data, actual location of harvests outside slide areas, or lack of training on how to recognize unstable areas, etc. Hanley said it is primarily a training issue. He sometimes has to get out a ruler and estimate the slope gradients in the DPO maps for himself.

Palkovic said that operators sometimes mark old slides, and some have maps that color-code areas >67% slope. Hanley noted that the Sealaska DPO maps show existing slide scars and list what they will do to mitigate mass wasting hazards.

Landwehr said that it would be useful for the operators to list the range of slopes in their units in the DPO. Hanley noted that USFS unit card maps do identify areas with >72% slopes. Palkovic noted that the DPOs do list the percentage of ground in each slope gradient class.

Hanley said that we may just need operator training in mass wasting hazard recognition.

Staunton stated that the purpose of the DPO is to start a dialog with the operator; it is not a permit. The agencies may need to be explicit if they want additional slope information on a map.

Palkovic commented that operators are usually responsive when they are asked to show known slides on a map.

Yarding systems. Burkhart explained that in the field, the choice of whether to use helicopter yarding or other methods is usually dictated by how much timber is there, and how it's distributed. For example, when does it not pay to build a road due to a muskeg crossing, V-notches, etc., relative to the value of the timber?

Moselle stated that there is a lot of information in the BMPs about what to do with a road if steep slopes are involved, and if water quality and fish habitat are involved. When they're not involved, the reviewer's brain "clicks off." If there is no road, but operations are occurring on steep slopes, what considerations cover the fish habitat and water quality concerns. For example, could cable-yarding on an unstable road be added up? (*Kyle – please check – my notes were fuzzy here*)

Landwehr said that the only thing missing from the BMPs is something directing the operator to consider effects on downslope resources. It's necessary to determine if there's a significant adverse effect.

The committee recommended the following addition to the cable yarding BMPs under 11 AAC 95.290 to minimize surface and root disturbance. A second addition could be added to either .290(c) or .340 recommending that operators consider alternative yarding methods and partial harvesting on unstable or slide-prone areas.

C6. Add to 11 AAC 95.360 Cable yarding: [...] (c) The following standards apply to cable yarding operations: [...]

(6) on unstable slopes or slide-prone areas, an operator shall minimize disturbance to soils, understory vegetation, stumps, and root systems. Add to this section or to .340: In these areas, an operator should consider partial cuts, helicopter yarding, retention areas, or other techniques designed to meet these objectives.

Staunton asked about the advisability of scarification to encourage Sitka spruce regeneration. Landwehr replied that it shouldn't occur on steep slopes.

Burkhart commented that the existing timber industry has been beat down to nothing, and some operators may not have full suspension capability.

Tracked and wheeled harvesting. Hanley stated that tracked and wheeled harvesting system are not applicable to these conditions – they are suicidal on steep slopes. Moselle asked whether future problems are anticipated. Hanley replied that if steep slopes are evident from the DPO, and the proposal is to operate with skidders, the agencies would ask up front how that would be feasible.

Burkhart reported that he has seen some spectacular shovel logging in the Lower 48. Some operators have equipment that can harvest up to 60% slopes. They use lighter machines with shorter booms and a mechanical head. They can process but not fell timber on those slopes. His company has done some of that type of work in the Lower 48.

Hanley said that the last years of Icy Bay harvesting was all shovel logging, but the operations were not on slopes as steep as those discussed here. They were up to 35% gradient.

The committee recommended that tracked and wheeled harvest systems on unstable slopes or slide-prone areas should require prior written approval by the Division of Forestry.

C7. Add to 11 AAC 95.365. Tracked and wheeled harvest systems: (a) A person may not skid timber or operate construction equipment or machinery in a water body catalogued as anadromous under AS 16.05.871, without written approval of the Department of Fish and Game, or in any other surface waters, marshes, [OR]non-forested muskegs, or unstable slopes or slide-prone areas without prior notice to the division except, that equipment may be operated on frozen surface waters, marshes, or non-forested muskegs without prior notice to the division.

Landwehr asked about avoidance of steep or unstable slopes. Burkhart replied that harvests on steep or unstable slopes usually use full suspension, and harvest more than 50% of the trees.

Burkhart stated that cable yarding is different than partial harvesting with helicopters. Helicopter harvesting can skip steep areas, V-notches, etc. It is unwise to fell into V-notches because you can't get the timber out. Initially, the opportunities for helicopter logging were only on slopes too steep to build roads. Burkhart said that the I-90 corridor was logged in 1984 on slopes up to 75% gradient. However, that area has a different climate – it's dry country. In Alaska, helicopter harvesting has occurred successfully along the Klawock Highway, Port St. Nicholas, near Thorne Bay, in Bear Valley near Ketchikan, etc.

Burkhart added that there is no guarantee that an area won't slide. Along the Mitkof Highway there are big, mature spruce trees. If a slide was to go all at once, it would make more of an impact if the area is uncut than it would after a cut because of the wood volume on the slope. However, you can't know whether it will slide or not. That's true for any hillside. Dennis commented that it's a matter of risk management.

Burkhart said that there are areas on the Mitkof Highway slope that you would want to stay away from, including past slides and sloughs. You could stay away from all that stuff in a harvest operation.

Staunton noted that if windthrow follows a partial helicopter cut, it could lead to a landslide trigger.

Burkhart commented that he is working with people designing the Slake timber sale. We want to stay away from ridges and steep breaks. You can avoid potential windthrow problems. With helicopter logging you are not stringing cables or building roads. You can take one or two trees and then move on to another area.

Staunton said that we assume operators are investing capital and will therefore listen to their professional foresters' advice on slope stability.

Burkhart commented that there is lots of management on the ground for helicopter operations – more than for other types of operations – to decide when you can and can't do something.

Hanley recommended that the S&TC suggest consideration of partial harvests with helicopter yarding in unstable and slide-prone areas. Burkhart said that partial cuts sometimes create more problems. There are not a lot of people in Alaska who like to partial cut with yarders.

Moselle reported that the Ocean Boulevard project (*near Ketchikan?*) was a mechanical thinning on more level ground. Burkhart stated that it was laid out incorrectly, and that it may be helicopter logged instead.

Kleinhenz noted that the line on what is a partial cut is variable, it's a range. Freeman reported that "partial cut" is defined in the FRPA regulations as, "tree removal other than a clear cutting, such as removing only part of a stand."

Staunton commented that if the intent is to assert that partial cut harvesting is best to avoid impacts, the literature doesn't necessarily support this statement.

Road construction. Hanley noted that 11 AAC 95.290(b)(3) says that an operator, may not conduct excavation and blasting activities during saturated soil conditions if mass wasting *is likely to result and cause degradation of surface or standing water quality*. Moselle and Hanley said that blasting on steep, unstable, or slide-prone areas during saturated conditions is a high-risk combination. Staunton responded that site-specific conditions may allow it. Prohibiting blasting in these areas during all saturated soil conditions would shut down road construction from November through April.

Landwehr clarified that soil saturation means that the field capacity of the soil to hold water has been exceeded. To reach this condition, it would have to be raining. When the soil is saturated, it liquefies with any disturbance. You don't want to be blasting then. When the soil is saturated there is essentially a lake on a slope. There is a water table forming in the soil.

Moselle said that he didn't want to stop road-building for significant a period, but given this definition for "saturated soil," it sounds like it wouldn't affect long period. Landwehr said that the USFS has a similar provision in its contracts to prohibit blasting under saturated soil conditions.

Staunton said that the type of overburden has a big influence on stability. Landwehr said that some road building in rock would be doable – limestone isn't easily saturated. The issue is that Southeast Alaska soils can get so wet that a water table builds in the soil. Slope failures occur where flow is concentrated. Hanley reiterated that if the soil is saturated blasting has a high probability of causing mass wasting. Staunton said that he wouldn't want to pay for excavation activities as an owner that lead to fill in saturated conditions – the fill won't compact properly. Earthwork activity includes excavation and filling. Staunton agreed that the concept of field capacity needs to be clarified to the operators in FRPA training as it relates to the term saturation. He thinks that a lot of operators may not understand this concept until they see it affecting the operation.

Palkovic asked whether there were any implications for Regions II and III.

The committee agreed that saturated soil conditions mean the field capacity of the soil is exceeded, so that a water table is building in the soil. Under these conditions, the risk of a landslide is great enough that excavation and blasting present such a significant risk of slope failure that they should not occur.

C8. Edit 11 AAC 95.290(b)(3) to prohibit blasting in saturated soil conditions:

“(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(3) may not conduct excavation and blasting activities during saturated soil conditions, [IF MASS WASTING IS LIKELY TO RESULT AND CAUSE DEGRADATION OF SURFACE OR STANDING WATER QUALITY.]

Wolfe asked whether the proposed definition of “unstable slope or slide-prone areas” is different than the information in the scoping model. Freeman said that the scoping model and maps are a good source of information on where “unstable slopes or slide-prone areas” may occur, with the addition of site-specific information.

Hanley raised the issue of slope information provided on DPO maps. It would be helpful to the agencies to get this information on a map. Sealaska has been helpful on their DPOs, for example for harvests on the Cleveland Peninsula. Wolfe noted that the Cleveland Peninsula had more data available than some areas, but it's expensive to get that data. He asked whether data on contours is coming along for others. Staunton replied that better data is available, but it is not economical to collect LIDAR data everywhere. A better digital elevation model will be coming out of the Alaska mapping initiative.

Wolfe said that he is mindful that not all corporations can do what Sealaska does, and asked whether others can get the data they need from the state.

Moselle said that to address this issue a change may be needed on the DPO form rather than in the regulations. Hanley added that the information received is inconsistent. He would like help to get slope information on the DPO maps. Wolfe observed that operators need to know what information is available and where to get it.

Wolfe thanked the S&TC for their time spent on these issues.

Next meeting: November 1, 8:30-4:30 or as needed. This may be a web meeting.

- Review history and definition of “significant adverse effect” in AS 41.17.060(b)(5).
- Consider whether a definition is needed for “saturated soil conditions.” “likely to occur,” and “likely to result.” With respect to operations on unstable slopes or slide-prone areas
- Review proposed definitions and changes with particular attention to interaction of definitions with other regulations.

- Discuss whether there needs to be clarification that not all slopes over 50% gradient are unstable or slide-prone.
- Consider whether proposed changes have any impacts on Region II or III.
- Determine whether to add any of the publications handed out or other materials to the bibliography.
- Discuss whether to request steep/unstable/slide-prone slope data in DPO on maps and FLUPs.
- Clarify training needs including,
 - Identification of “unstable and slide-prone areas,” including information available from the scoping maps, digital elevation models, and other sources.
 - Identification of “saturated soils”.
 - Any changes adopted in regulation or made to the DPO form.

To Do

Freeman

- Write up minutes, send to S&TC for review/edits, then send to public mailing list and Board (Done 9/22/10)
- Send copy of handouts to Baichtal. (Done 9/22/10)
- After checking with State Forester, post scoping maps with explanation of context/limitations on the DOF website. Include a notice that we have done so in the cover letter to the public. (Done 10/11/10)
- E-mail purple book text to S&TC (Done 9/22/10)
- Research background on term “significant adverse effect” in Green Book and elsewhere. Check to see what contexts use “significant” in the Act and regulations. (Done 10/14/10)
- Identify whether FLUPs are including information required in a DPO. (Done 10/13/10; checked with Palkovic, Moselle, Hanley. FLUPs include similar info, but state timber sales rarely on steep/unstable slopes due to land ownership location.)
- Review proposed changes with DOF Coastal and Northern regions to determine whether there are impacts on operations in Regions II or III. (In progress)

Landwehr

- Send copy of publication/report from Nowacki and Landwehr the impact of full suspension vs. partial suspension on soil disturbance. (Done 9/16/10)
- Provide material to help clarify the definition of “saturated soils” (Done 9/16/10)
- Send copy of definition or information clarifying “Frequently dissected slopes” are a category in the Tongass National Forest landform handbook. (Done 9/16/10)

Handouts

- Agenda
- Public mailing list for Landslide S&TC minutes
- Summary chart of additional references
- Additional references
 - Best, T. 2001. Impact of timber harvesting on landslide processes. Appendix B in Engineering geologic, and erosion control study for Pocket Canyon Timber Harvest Plan
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- Washington State Dept. of Natural Resources. 1997. Watershed analysis manual. Appendix A. Mass Wasting. Pp. A-1 to A-48.
- S&TC Notebook
 - S&TC Contact List
 - Phase 2 S&TC organization and operations
 - Landslide S&TC Consensus points, July 27, 2009
 - Landslide bibliography, July 29, 2009
 - White paper of landslides and FRPA, May 2010
 - Excerpt of draft minutes, Board of Forestry meeting, March 17-18, 2010
 - “Green Book” principles
 - FPRA Landslide S&TC Update on scoping of landslide hazards in potential timber harvest areas, October 7, 2009, updated August 4, 2010 (PowerPoint)
 - Scoping maps
 - Letter to interested citizens, August 16, 2010



Minutes
FRPA Phase 2 Landslide Science & Technical Committee (S&TC)
Meeting #2 – November 1, 2010
Web meeting – Anchorage, Juneau, Ketchikan

S&TC Attendees: Bert Burkhart, Marty Freeman, Kevin Hanley, Adelaide (Di) Johnson, Dennis Landwehr, Kyle Moselle, Pat Palkovic, and Greg Staunton. Jim Baichtal was absent. There were no visitors.

Minutes. The minutes from the September 2 meeting with one change from Landwehr. Johnson will review the minutes this week and get comments to Freeman no later than Friday.

Scoping follow-up. The scoping maps, model, consensus points and bibliography from the scoping phase have been posted on the Division of Forestry website. Freeman will send a notice of the posting to the public mailing list along with final minutes from the September 2 meeting.

Bibliography. The S&TC discussed references submitted to the committee in September, plus a report from Landwehr & Nowacki on soil disturbance. The committee determined that Chatwin & Smith, 1991;

Chatwin, 1994; Fannin et al. 2007; Landwehr & Nowacki, 1999; Roberts et al., 2004.; Schmidt et al., 2001; Sidle et al., 1985, and Washington DNR, 1997 were relevant studies from British Columbia and SE Alaska, and should be included in the bibliography.

Megahan & King, 2004 was included after extensive discussion. Landwehr stated that it addresses dry sites in the Northern Rocky Mountains, and the information on disturbance is dated. Johnson said that the slide mechanisms are similar to those in Alaska, and the methodology in the paper could provide a starting point for a similar analysis in Alaska. Palkovic asked whether the methods in this paper are already discussed in other papers in the bibliography. Landwehr added that the methods are well-established, and the USFS has adopted new nationwide methods. Landwehr and Nowacki, 1999 covers the benefits of reduced soil disturbance on Alaska sites. Johnson said that the bibliography should also include a peer-reviewed paper covering that information. Landwehr noted that the Megahan & King paper uses information from the Northern Rockies 30 years ago vs. local information from 10 years ago in the Landwehr and Nowacki paper. Moselle suggested checking to see if the Megahan & King paper is referenced in other papers in the bibliography; if so, it wouldn't be necessary to include it. Johnson said that it doesn't hurt to include the paper and it documents that 10% of the slides were in partial cut harvest areas. Landwehr observed that it is hard to determine the method the authors used to determine the percentages, because the data aren't tied to a land area – we don't know how much of the landscape was in each harvest category. That makes it hard to draw out good inferences. Moselle recommended not including the paper – the slopes are different in Oregon and SE Alaska. The USFS and DNR have a good inventory of Alaska slides, and where they occurred – we could do our own report based on local information. Johnson said that such a study might cite Megahan & King. Following the discussion, the committee agreed to include the report in the bibliography.

Schmidt et al., 2001 was included. It documents changes in root cohesion in industrial forests with past harvesting in Oregon.

Sidle et al., 1985 synthesizes studies from multiple sites relating to landslide frequency and crown cover reduction in partial and clearcut harvesting. It was included in the bibliography.

The Washington DNR, 1997 report was included in the bibliography. It includes a description of a process for conducting mass wasting assessments.

Best, 2001; Megahan et al., 1995; and Northwest Forest Plan Regional Ecosystem Office, 1997 were not included because they were from sites that were too different climatically and geomorphologically. Staunton commented that he worked on a fire in the Siskiyou three years ago, and that the area is geomorphologically different, and has a strikingly different history of excessive harvesting on erodible soils. It is not comparable to Alaska. The paper appears to have been written as a summary to determine where to spend money to fix problems. See also the November 1 reference supplement (*see handout*) for notes on individual papers.

Landslide risk, public safety, and fish habitat. Johnson noted that the direction from the Board of Forestry is to focus on landslide impacts on fish habitat and water quality. She suggested that fisheries experts should be included on the S&TC. Moselle is a fisheries biologist. He said that the point is to keep slides out of streams, rather than walking a line to determine how much sliding into streams is OK. Johnson suggested that some threshold is needed, because some natural slides benefit fish habitat. Moselle volunteered to search the literature on this topic. Freeman will send links to other FRPA bibliographies that include fisheries literature to Moselle. Johnson will also forward references to Moselle.

Later in the meeting, Johnson raised concern that Board members commented that addressing landslide concerns with respect to fish habitat and water quality will take care of risks to public safety. She

disagreed with that perspective. Freeman and Moselle clarified that the Board suggested that preventing impacts from slides on fish habitat and water quality would have side benefits for public safety. However, the Board was clear that they did not want to change FRPA to directly address public safety. The Board felt that public safety was better addressed through other means, particularly local government regulation under Title 29. Moselle asked Freeman to send Johnson a copy of the “decision tree” used by the Board in determining options for public safety issues

Definitions.

“**Significant**” and “**likely**.” Freeman provided an overview of the many different phrases using “significant” and “likely” in the FRPA and regulations (*handout*). Only one of these terms is further defined: “significant impairment of the productivity of the land and water” is defined in the Act (AS 41.17.900).

“(24) "significant impairment of the productivity of the land and water" means an activity that may foreseeably result in prolonged or substantial damage to renewable resources or prolonged or substantial reduction of the continuing capability of the land or water to produce renewable resources at their natural or historic levels;”

The Alaska Coastal Management Program (ACMP) defines “direct and significant impact” and “use of direct and significant impact.” Some state area plans adopted a similar definition for “significant impact” and “significant effect” (*handout*). The “Green Book” that documented the 1989 process to revise the FRPA had no reference to an adopted or working definition for “significant”. Freeman also contacted Robert Loeffler, the lead DNR staff on that process who reported that “significant” was used in the general sense at that time, not in the specific sense adopted in ACMP.

Webster’s Dictionary defines “significant” as
“1. a) having or expressing a meaning
b) full of meaning
2. important; momentous”

Johnson asked whether the S&TC could define “significant sediment input.” Hanley said that it is defined by whether it exceeds water quality standards. Moselle said that the threshold is set in the DEC water quality regulations. DEC has done their homework to set those standards, and ADF&G uses the DEC regulations.

Moselle noted that field staffers typically don’t know what past levels of sediment are in specific streams; they have to use their best professional judgment. Disagreements on fish habitat impacts don’t come up too often. When they do, it comes down to opinions, but DEC regulations do have objective water quality standards that ADF&G leans on regarding suitability for fish. It’s not clear that a new definition was needed.

Landwehr commented that the S&TC kept bumping up against the term “significant” when discussing how to prevent slide impacts. Is a ½-acre slide that doesn’t hit a stream a significant impact to water quality? What level of risk will we accept – 90%? 100%? Do we recognize that not all slides are preventable? The Committee got pretty picky with some definitions. If we are not getting that specific, then the question of significance decreases.

Palkovic said that when questions regarding “significant” come up in FRPA work, DOF also considers the definition of “degradation of water quality” in the FRPA regulations (11 AAC 95.900)

“(20) "**degradation of water quality**" means a decrease in water quality such that the affected waters are unable to fully maintain existing or designated uses; "degradation of water quality"

does not include changes that are temporary, localized, and reparable decreases in water quality; in this paragraph

(A) "reparable" means an effect on, or change to, a use or aquatic system due to a decrease in water quality that is reversible by natural processes such that the use or system will return to a state functionally identical to the original;

(B) "temporary" means 48 hours or less with respect to existing uses"

Staunton noted that field staffers usually don't have records on specific streams with which to compare current conditions. Inspectors have to build a case of obvious change based on professional judgment and history. Hanley added that inspectors can usually compare upstream and downstream reaches.

Johnson said that it's hard to progress unless the S&TC can define what's acceptable.

Hanley reiterated that acceptable water quality impacts are already laid out in the water quality standards. He added that the original intent was not to require that DEC issue a variance for every stream crossing.

Johnson said that a landslide into a stream will cause effects for more than 48 hours, and you can't always predict whether a slide will enter a stream.

Hanley noted that "significant impairment of productivity" is also defined (AS 41.17.950)

"(24) "significant impairment of the productivity of the land and water" means an activity that may foreseeably result in prolonged or substantial damage to renewable resources or prolonged or substantial reduction of the continuing capability of the land or water to produce renewable resources at their natural or historic levels;"

Moselle stated that one of the goals for the FRPA best management practices is to recognize that when an operation is in a slide-prone area, BMPs apply to prevent mass wasting. The "significant" definition matters when all that fails and a slide occurs -- then we have to decide what to do and whether it is a significant impact.

Johnson recounted that she studied the 1993 slides, and every slide hit a stream. Some streams went into muskegs and the sediment stayed there. In others, sediment moved for years after that, but the USFS didn't analyze where it went. There's a lack of full understanding of the impact of slides on water quality. She recommended that the bibliography include more studies on the impacts of slide-caused turbidity of water quality and fish habitat. Moselle agreed to review the literature on that topic.

Hanley stated that a slide is significant if it affects water quality, not if it is just a slide that stays outside streams. Palkovic concurred. She said that a field inspector will first check to see whether the slide reached the water body, and what type of water body it is. Next they consider the potential for continued sliding, especially if there is water downslope. Reforestation standards require that no more than 10% of an area remain unstocked. There is potential for additional actions to prevent material from entering waters.

Hanley added that if the practice that caused a slide directly contradicted the BMPs, the agencies could still consider it significant.

Moselle said that when a slide enters a stream, ADF&G will go out on site. If the stream is non-anadromous, then ADF&G looks to see whether resident fish passage blockage is an issue. If so, they can direct that fish passage be restored. ADF&G determines whether it is more detrimental to get equipment in the stream than to leave it and allow additional sediment and gravel in the system. If a slide is hanging on a stream bank, the goal is to stabilize it -- pull it back from the edge, seed it, and require other actions to keep it from becoming significant. He noted that anadromous streams also have buffers, and it is less

likely that slides will reach them. ADF&G also looks to see how close the slide is to the stream. Decisions are site-specific using best professional judgment.

Staunton reiterated that significance is defined with respect to water quality. Impairment of productivity also relates to the costs of infrastructure beyond the slide – what will it cost to maintain a road? If a slide will cause a company to put a lot of money in to keeping a road maintained to FRPA standards, it's a significant slide – it indicates that the human ability to address the slide is limited due to the magnitude of material in the slide. If we can't put the material back in place, that's significant. Moselle said he wasn't clear that significant means "too big to deal with." Staunton said that a slide is obviously significant if it too big to fix. If an operator can't address the problem within the normal costs of operation, it's clearly significant. The operation should be conducted in such a way that damage rectification can be done with the resources at hand; if not, the operator has crossed a threshold of reasonable actions.

Moselle asked for clarification – this doesn't suggest that an operator that causes a big slide gets a "Get out of jail free" card. Staunton said that's right – if an operator is putting a road on a slope he can't maintain, he's made a significant impact and is responsible for the problem. If you have ground that will be a constant, oozing wound, you should consider alternative approaches like helicopter yarding.

Freeman asked whether there have been disagreements among the agencies over whether slide impacts were significant. Moselle said that he didn't remember any elevations over whether a slide impact was significant or not. On fish streams, ADF&G would get together with Hanley. He said that ADF&G doesn't question DEC on their determinations of water quality impacts, and that foresters hopefully wouldn't question DEC/ADF&G calls on fish habitat impacts based on the due deference requirements in the Act.

Hanley said that there have been some disagreements, but none recently, and none were elevated. The issue was on a slide that ran directly into saltwater. There was a difference of opinion between agencies. The slide was deemed insignificant since it didn't affect a freshwater stream.

Palkovic commented that different people see different things in the field. There are discussions on significance in the field, but the agencies have been able to reach consensus on how to address them. Hanley said that the most recent example was on the Perry Creek Road slump, and that was resolved. Palkovic said that the discussions are healthy – they produce better solutions.

"Significant rutting and ground disturbance." Hanley commented that a discussion on a definition of "significant rutting and ground disturbance" (11 AAC 95.290(h)) would be useful. There are sometimes deep ruts in shovel and skidder units that don't affect water quality and are therefore deemed acceptable. Palkovic concurred. She added that she does raise those issues with operators, and lets them know that poor practices even outside riparian areas raise red flags about the operation. Moselle noted that the rutting he has seen has not been on steep slopes, and Hanley agreed. Moselle observed that changes in the machinery and methods available for harvesting might have implications for rutting and productivity. Freeman noted that this issue is outside the purview of the Landslide S&TC, but will convey the item to the Board for future consideration.

The S&TC did not recommend a new definition for "significant" at this time. If it becomes apparent during discussion of the BMPs that a specific term that uses "significant" need a definition, it can be developed at that time.

"Likely." Freeman reviewed the multiple terms that use "likely" (see handouts). None of the terms have specific definitions in FRPA or related statutes. The Webster's dictionary definition is, "seeming as if it would happen or make happen; reasonably to be expected; apparently destined. Likely suggests probability or an eventuality that can reasonably be expected."

Moselle said that the dictionary definition is the way that it is normally used in FRPA – as “probable” or “reasonably expected.” The test the agencies use is “probable” more than “possible.” Johnson agreed that “possible” is vague, and that “probable” is the real question. Moselle said there is wide agreement on that. An agency needs to argue that it will probably happen.

Hanley described a situation at South Cholmondeley with saturated soils in the fall. He felt it was not an issue of if a slide would occur, but how big it would be. In that case he felt a slide would likely occur, although there was a disagreement with DNR. Moselle said that due deference isn’t granted until a slide actually hits a stream.

There was general agreement that “likely” is used in the sense of “probable.” No new definition was recommended.

“Saturated soil conditions.” Freeman recounted that at the last meeting, there was some confusion about just how wet the soil had to be to count as “saturated”. Landwehr provided info from Tongass (see handouts on blasting standards and quarry and borrow standards and guidelines). Landwehr emphasized that under saturated conditions there is a water table forming in the soil, although not necessarily all the way to the soil surface.

Johnson suggested that antecedent moisture conditions be considered in defining “saturated soil conditions.” Staunton noted that conditions vary with different soil types.

Freeman clarified that the term “saturated soil conditions” is used in the BMPs on blasting on steep or unstable slopes (11 AAC 95.290(b)(3)) and tracked and wheeled harvesting (11 AAC 95.365(d)).

Landwehr explained that the Tongass National Forest contract stipulations for blasting (handout) try to address antecedent moisture conditions by identifying specific rainfall amounts in given time periods. Some operators have rain gages on-site; others use local weather data. He said that the “1 inch in 24 hours” standard is fairly stringent. The standards were developed following slides in the late 1980s that occurred during saturated soil conditions. He added that a slide occurred on a USFS road project at Harbor Mt. in Sitka last winter that could have been prevented with use of the blasting standards and consideration of antecedent moisture conditions.

Hanley said that a definition is needed that is usable in the field. He said that if the slide at South Cholmondeley had been above a residential area rather than just saltwater, the impacts could have been significant. His recommendations weren’t heeded. Without a definition, people are just using intuition unless they are professional soil scientists. Johnson asked whether the impact isn’t greater when it affects a residential area. Moselle responded that causing slides is bad practice regardless of the resources affected. Palkovic agreed that clarification to the definition would be helpful.

Landwehr reiterated that “saturation” means there is free water in the soil. Water is flowing over bedrock on an outslope. “Saturation” is “a condition in which all easily drained voids (pores) between soil particles are temporarily or permanently filled with water.” This describes fully saturated soil. Johnson asked whether it is not fully saturated if voids are filled in only part of the soil profile.

Staunton suggested that something similar to a slump test for concrete is needed to gage the ability of soil to stay together cohesively.

Landwehr said that in the TLMP standards and guidelines, the direction is to look at whether there is free water in the soil profile on top of an impermeable surface (slip plane). That is a “watch out!” situation. There are often nearby outcrops that can be checked to see whether there is water pouring out.

Moselle suggested using the Landwehr definition plus examples of indicators. Hanley agreed that it is helpful to say, “saturated soil conditions” are evidenced by....

Staunton drafted a list of indicators, which the group discussed.

The committee agreed that it would be helpful to include an indicator for “high rainfall.” Staunton commented that many operators in logging camps won’t have rainfall information on-site. Moselle said that the rainfall indicator is helpful, but might also insulate someone from taking an objective view of the particular site conditions. It is better to provide some example.

Palkovic said that the National Weather Service has definitions for categories of rainfall. Johnson emphasized that for the FRPA application it is important to incorporate antecedent moisture. There is a hazard if there is a period of hard rain, then a break, then more hard rain. Moselle responded that under those conditions there would likely be several evident indicators of saturated soil conditions present.

Hanley said that the indicators should include rainfall over a 24-hour period. Landwehr said that TLMP uses a 72-hour period, and gives the other thresholds in the contract stipulations. The stipulation thresholds are pretty stringent. He said Swanston’s paper used 6 inches in a 24-hour period. TLMP refers to “72 hours following a two-year 24-hour storm.” Hanley said that language wouldn’t be meaningful to operators.

The Committee agreed to check Swanston’s data for rainfall indicators.

Johnson suggested including “rain-on-snow” events in the list of indicators.

Palkovic recommended reviewing the section on ground-skidding (11 AAC 95.365(d)) with respect to applicability.

Following the discussion the committee agreed to the following draft list for use in the blasting BMP in 11 AAC 95.290. Specific rainfall indicators will be added after reviewing the literature on this topic. Johnson agreed to check the literature.

C9. With respect to blasting on steep or unstable slopes under 11 AAC 95.290(b)(3), the following indicators should be included to help operators determine when saturated soil conditions exist:

“Evidence of saturated soil conditions on a steep slope or unstable area may include:

- On cutslopes, noticeable soil liquefaction* or movement of large soil particles to the ditchline
- Significant water flow evident on the surface, exposed bedrock, or impermeable hardpan
- Excavated or disturbed material performing in a liquid manner
- High rainfall rates in previous 24 hours or several days of moderate to high cumulative rainfall, e.g., 6 inches in a 24-hour period or __ inches in __ days
- Heavy rain following extended periods of freezing
- Heavy rain-on-snow events”

**Should this be “liquefaction” or “liquefication”?*

“Frequently dissected slopes.” Freeman recounted that the proposed definition of “unstable slope or slide-prone area” includes “frequently dissected slopes” as one of the indicators, and there was some discussion what that meant on the ground. Landwehr provided additional information in the Tongass “Landforms of the Alaska Region Classification Guide” (see handout). The guide defines “frequently dissected slopes” as those having more than 10 dissections per mile and an interfluvial distance less than 500’. Landwehr said that an even smaller interfluvial distance might be appropriate for the purposes of the

forest practices BMPs on landslides. He was not aware of specific literature describing interfluvial distances with respect to landslide initiation potential. Johnson agreed to review the literature to see if anyone has quantified interfluvial distances with respect to landslide initiation zones.

Moselle clarified that a narrower interfluvial distance would raise the bar for identifying sites with this condition.

Landwehr noted that the 500' interfluvial distance comes from the document on mapping landforms. Johnson commented for mapping it is hard to see these dissections without LIDAR unless there is a clearcut.

Moselle said that the FRPA definition should meet the objective of identifying slide-prone sites, and be field-based. The point is to minimize debates.

Landwehr said the concern is where the streams are so close you can't fall a tree without dumping it in a stream – the distance is closer to local tree height. It is where it becomes a pain to yard, or where you can't split-yard because of the stream density. Moselle suggested that using yarding abilities is a good approach.

Moselle noted that dissections don't all have active streams. Johnson said that stream presence on these sites depends on the season and rainfall.

Hanley stated that in a proposed clearcut, signs of frequent flow channels at some seasons would raise concern. For example, lack of moss on exposed channels indicates that there's enough flow over time to prevent vegetation growth. Streams have some incision; dissections don't have the same structure.

Landwehr clarified that the definition refers to the distance between occurrences, not whether the structure is a stream channel or a dissection.

Hanley noted that in narrow areas operators could swing-yard instead of split-yard. Johnson said that the definition shouldn't be based on logging practices – operators could choose to helicopter-yard, but there would still be a loss of root strength.

Staunton said that tree-height is a distance that can be easily grasped in the field.

Landwehr recapped that Johnson will check the literature, but that he believes the interfluvial distance should be closer to 200'-250'.

“Unstable slope or slide-prone area.” Freeman reviewed the proposed definition of “unstable slope or slide-prone area” for clarification. She said her understanding of this definition is that it defines a term that was previously undefined. A 67% gradient is used as a threshold for “steep slopes,” but there wasn't a definition for other slopes that were unstable or slide-prone. The proposed definition

- Recognizes that slopes under 67% gradient may be slide-prone or unstable
- Identifies characteristics that are indicators of unstable or slide-prone areas on slopes <67% and generally >50%
- Recognizes that not all slopes >50% are slide-prone
- Recognizes that if clear indicators exist, a slope may be unstable or slide-prone even if it is <50% slope.

Johnson said that if people are downslope, even a 50% cutoff isn't good enough. Freeman noted that it isn't all-or-nothing – even if a slope is judged not to be slide-prone, the other BMPs still apply. Public landowners will certainly seriously consider additional risks if people are downslope. Also, the scoping

maps and other information from the S&TC are now available on-line, and Freeman will include a notice about the available information along with the next letter to the mailing list.

Staunton added that the DPO is a starting point for discussion with the operators. Most operators aren't technically analyzing the ground. Many are just using existing maps for the DPOs although most, but not all, now have GIS capability. The 50% vs. 67% threshold is less important.

Moselle stated that the proposed definition is not extending the FRPA authority beyond 67% for "steep slopes." Rather, it is defining "unstable slope or slide-prone area" which isn't currently defined.

Johnson asked whether the agencies are also looking for patches of deciduous trees. Palkovic said yes.

Moselle asked about the term, "high density of streams or zero-order basins". Operators are used to focusing on anadromous waters. Palkovic responded that the regulations already have a definition of "stream", and operators are supposed to identify all surface waters.

"11 AAC 95.900 (80) "**stream**" means a perennial flow of water along a defined channel, or an intermittent flow of water along a defined channel that is significant for protection of downstream water quality;"

Hanley said that operators just have to identify stream crossings in the DPO, but Palkovic responded that 11 AAC 95.220(a)(5)(A) also requires information and classifications of known surface waters within or abutting harvest units.

Landwehr said that it would be helpful to know the source of the 67% gradient cutoff. He believes it is from the internal angle of friction for till soils. Freeman said that she will try to find out. She also noted that the Green Book on the 1989 revision process referred to a 60% threshold.

"**Unstable fill material.**" Staunton noted that the current recommendation for a definition of "unstable fill material" includes, "Organic soil contains more than 20% carbon." He understood that the percentage applies to the weight of carbon in the soil, and said that would not be familiar to operators. He suggested dropping that sentence, and the S&TC agreed.

<p>C5am. Add the following term to the definitions in 11 AAC 95.950: "Unstable fill material" means organic debris, organic soil, or fine-textured mineral soils. A fine-textured soil has a texture of silty-clay, sandy-clay, or clay.</p>
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Regions II and III. Freeman asked Rick Jandreau, Regional Resource Forester for the Coastal Region, and Doug Hanson, Regional Resource Forester for the Northern Region to review the draft recommendations from Meeting #1, to determine whether there were any unforeseen implications for operations in Region II or III. They reported that the recommendations didn't cause any issues for Regions II and III.

DPOs and FLUPs. Following discussion about DPOs and FLUPs at the September 2 meeting, Freeman asked for feedback from Palkovic, Moselle, and Hanley on whether there are issues with slope stability information in Forest Land Use Plans (FLUPs) for state timber sales versus the Detailed Plans of Operation (DPOs) required for sales on private, municipal, and trust land, given that the FLUP statutes don't contain the specific list of items to cover that is in the regulations on DPOs. Palkovic reported FLUPs contain similar information to the DPOs, but state sales are rarely on steep or unstable slopes due to location of state land ownership. All three reported that they are comfortable with the state sale layout and FLUP review processes.

Overview of proposed changes

Road construction. The S&TC confirmed the recommendation to edit 11 AAC 95.290(b)(3) as follows:

“11 AAC 95.290. Road construction. [...]

(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(3) may not conduct excavation and blasting activities during saturated soil conditions. [IF MASS WASTING IS LIKELY TO RESULT AND CAUSE DEGRADATION OF SURFACE OR STANDING WATER QUALITY.]”

The Committee then discussed whether or not the phrase “and cause degradation of surface or standing water quality” is appropriate in .290 (d), which currently reads,

“(d) An operator shall use end-hauling and full-bench construction techniques if mass wasting from overloading on an unstable slope or slide-prone area or erosion of sidecast material is likely to occur and cause degradation of surface or standing water quality.”

There was not consensus about whether the phrase on degradation currently applies only to “erosion of sidecast material” or to both that and “mass wasting from overloading on an unstable slope or slide-prone area.”

The initial suggestion was to separate the two clauses as follows so that the phrase on degradation applied only to the clause on “erosion of sidecast material.” Moselle said that the change was clearer and could help decrease slides and their impacts.

“(d) An operator shall use end-hauling and/or full-bench construction techniques if
1) mass wasting from overloading on an unstable slope or slide-prone area is likely to occur, or
2) erosion of sidecast material is likely to occur and cause degradation of surface or standing water quality.”

Palkovic questioned whether dropping the degradation phrase from the mass wasting clause would cause unjustifiable expense for operators. She also asked whether it would create an inconsistency between (b)(2) in that section which addresses balancing of cut and fill. Freeman asked Palkovic and Staunton to review these sections before the next meeting and recommend an approach.

Next meeting: November 23, 8:30-12:30 Web conference

- Consider additions to the bibliography regarding fish habitat and impacts from slides
- Review “unstable slope or slide-prone area” definition re frequency of slope dissection
- Review indicators of “saturated soil conditions” re threshold for heavy rainfall over time; discuss whether they applies to 11 AAC 95.365(d) on tracked and wheeled harvesting or just to 11 AAC 95.290(b)(3)
- Discuss wording of 11 AAC 95.290 (d) re end-hauling and full-bench construction
- Review total package of recommendations
- Clarify training needs including,
 - Identification of “unstable and slide-prone areas,” including information available from the scoping maps, digital elevation models, and other sources.
 - Identification of “frequently dissected slopes”
 - Which slopes <67% are slide-prone
 - Identification of “saturated soils”.
 - Any changes adopted in regulation or made to the DPO form.

To Do

Freeman

- Write up minutes #2, send to S&TC for review/edits (11/4/10). Send to public mailing list and Board when final.
- Update bibliography and send to S&TC (done 11/4/10)
- Send links to other FRPA bibliographies to Moselle (done 11/3/10)
- Send the “decision tree” on public safety used by the Board to the S&TC (done 11/4/10)
- Check documentation on source of 67% as definition of steep slope in FRPA (done 11/10/10)

Moselle

- Review literature re landslides and impacts on fish habitat

Johnson

- Review Swanston papers for benchmarks for heavy rainfall to include in 11 AAC 95.290(b)(3) recommendation
- Review literature for information on frequency of slope dissection relative to slide initiation for possible inclusion in definition of “unstable slope or slide-prone area”
- Forward references on landslide effects on fish habitat to Moselle.

Palkovic/Staunton

- Review existing BMPs and draft recommendations for 11 AAC 95.290(b)(2) and (d) to determine whether there is inconsistency, and if so, recommend alternative language

Handouts

- Agenda
- Draft minutes from Sept. 2, 2010 meeting
- Reference supplement – updated Nov. 1, 2010
- Landwehr, D.J. and G. Nowacki, 1999. Statistical review of soil disturbance transect data collected on the Ketchikan Area, Tongass National Forest.
- Terms used with “significant” and “likely”
- Context and guidance re “significant” and “likely”
- 205.08 Blasting (Tongass National Forest contract stipulations)
- Quarry and borrow sites. TLMP Standards & Guidelines, p. 4-84
- Draft S&TC Recommendations on FRPA best management practices and definitions, Sept. 1, 2010



Minutes

FRPA Phase 2 Landslide Science & Technical Committee (S&TC)

Meeting #3 – November 23, 2010

Web meeting – Juneau, Ketchikan, Thorne Bay

S&TC Attendees:

Ketchikan: Bert Burkhart, Dennis Landwehr, and Pat Palkovic

Juneau: Marty Freeman, Kevin Hanley, Adelaide (Di) Johnson, and Kyle Moselle

Thorne Bay: Jim Baichtal and Greg Staunton

There were no visitors.

Minutes. The minutes from the November 1 were adopted incorporating minor changes.

Bibliography. Moselle reviewed literature relevant to landslide effects on fish habitat. The following papers are already included in the Landslide S&TC bibliography:

- Gomi, T., R.C. Sidle, and D.N. Swanston. 2004. Hydrogeomorphic linkages of sediment transport in headwater streams, Maybeso Experimental Forest, southeast Alaska. *Hydrological Processes*. 18: 667-683.
- Gomi, T., R.C. Sidle, M.D. Bryant, and R.D. Woodsmith. 2001. The characteristics of woody debris and sediment distribution in headwater streams, southeastern Alaska. *Canadian Journal of Forest Research*. 31: 1386-1399.
- Gomi, T., R.C. Sidle, R.D. Woodsmith, and M.D. Bryant. 2003. Characteristics of channel steps and reach morphology in headwater streams, southeast Alaska. *Geomorphology*. 51: 225-242.
- Johnson, A.C., D.N. Swanston, and K.E. McGee. 2000. Landslide initiation, runout, and deposition within clearcuts and old-growth forests of Alaska. *Journal of the American Water Resources Association*. 36: 17-30.
- Cederholm, C.J., and L.M. Reid. 1987. Impact of forest management on coho salmon (*Oncorhynchus kisutch*) populations of the Clearwater River, Washington: A project summary. In: *Streamside Management: Forestry and Fishery Interactions*. Proceedings of a symposium held at University of Washington, 12-14 February 1986, Seattle. E.O. Salo and T.W. Cundy, Editors. Institute of Forest Resources, Seattle, Washington, Contribution No. 57. Pages 373-398.

In addition, Moselle recommended including the following papers:

- For Miscellaneous Section: Bash, J. C. Berman, and S. Bolton. 2001. Effects of turbidity and suspended solids on salmonids. Univ. of Washington Center for Streamside Studies. Washington State Dept. of Transportation Technical Report WA-RD 526.1. 74 pp.
- For Region I section: Martin, D.J., and J.A. Kirtland. 1995. An assessment of fish habitat and channel conditions in streams affected by debris flows at Hobart Bay. Project 16-004 report written by Pentec Environmental, Inc., Edmonds, Washington. Written for Goldbelt, Inc., Juneau, Alaska. 40pp. plus Appendix.

Moselle commented that the Bash et al. paper includes a comprehensive review of the effects of turbidity on fish, and recommends sampling methods for assessing effects of turbidity. The Martin and Kirtland paper on mass wasting in Hobart Bay is relevant to the discussion on slides in Alaska, including the conclusions and field data.

Johnson agreed that these papers are good additions. She also recommended adding citations on a landscape model of sediment generation such as that incorporated into the NetMap methodology developed by Lee Benda with the Earth Systems Institute. Landwehr said that the NetMap system is sold by Earth Systems. There is also published literature on it. His understanding is that Tongass data doesn't fit well into the NetMap system. Johnson noted that the Tongass data is coarse, but it's better than nothing, and some Tongass areas have more specific digital elevation models. NetMap uses an approach similar to the one used by the S&TC in the scoping process. It can apply to a whole landscape. Johnson will check the literature for references that describe the underpinnings of the NetMap model.

The S&TC agreed to include the Bash et al. and the Martin and Kirtland papers in the bibliography.

Water Quality Standards and FRPA

Freeman recounted that at the last S&TC meeting, Palkovic, Moselle, and Hanley all noted that they consider the state water quality standards when determining whether there is a “significant” impact on water quality or fish habitat. She reviewed the connection between the water quality standards and FRPA.

The Alaska water quality standards are based on designated uses for the waterbody. Fish habitat is one of the list of possible designated uses, called “Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife” in the water quality regulations. This category is broadly applied to anadromous and resident fish streams. However, unless a stream or other water body is officially reclassified for a narrower set of uses, drinking water is also one of the uses for fresh water. DEC has only reclassified a few dozen streams to exclude drinking water, usually in association with major mining areas. Under the state water quality standards, the most stringent standards apply if waters are designated for more than one use. For fresh water uses, the standards for drinking water are the most stringent and, therefore, they are the standards that must be met.

DEC sets the water quality standards for Alaska. The standards set specific thresholds for sediment and turbidity (as well as temperature, toxics, and other parameters) for streams designated for water quality and fish habitat.

FRPA and the water quality standards are linked. DEC co-signs the FRPA regulations because they are the forestry BMPS for non-point source pollution control in Alaska. FRPA provides the enforcement mechanism for violations of water quality standards due to forest practices.

For implementation of FRPA, DNR is the lead agency, but must give “due deference” to DEC for water quality issues on all land ownerships.

Freeman noted that the FRPA regulations’ definition of “degradation of water quality” references the designated uses under the water quality standards: “ ‘degradation of water quality’ means a decrease in water quality such that the affected waters are unable to fully maintain existing or designated uses; ‘degradation of water quality’ does not include changes that are temporary, localized, and reparable decreases in water quality; in this paragraph

(A) “reparable” means an effect on, or change to, a use or aquatic system due to a decrease in water quality that is reversible by natural processes such that the use or system will return to a state functionally identical to the original;

(B) “temporary” means 48 hours or less with respect to existing uses” (11 AAC 95.900 (20)).

To meet this definition, decreases in water quality must be reparable and temporary. Hanley explained that this regulation was developed in recognition that DEC couldn’t do an individual site variation for every culvert installation.

Johnson asked how the water quality standards apply to harvest planning. Where there are hollows and subsurface flows, a trickle of water high in a harvest area could be a water source leading to a slide. It is hard to predict slide occurrence. How can you predict whether or not there will be major water quality degradation if there’s a drinking water supply? Hanley replied that DEC has three drinking water supply classes. Other creeks that are used by individuals for drinking water are covered by the water quality standards and BMPs. If a slide occurs that wasn’t in an area considered unstable or slide-prone, you can’t predict a slide. If BMPs were violated, then an operated could be cited.

Moselle emphasized that these are enforcement issues, not predictions. Similarly, you can’t predict when a driver will speed, but you can enforce the limits when speeding occurs. Hanley added that the Mitkof Highway situation is a good example. Homeowners get water from the streams. Because of those concerns, the Mental Health Trust hasn’t proceeded with logging.

Johnson observed that a steep stream that emptied directly into salt water could be protected by water quality standards. She asked whether it was the landowner's choice to opt out of harvesting in the Mitkof example. Hanley said yes, they didn't have to decide not to harvest. Johnson asked what would happen if there were no local homeowner's association to raise the issues with water quality.

Freeman explained that when an operator submits a DPO, the agencies review it. If the agencies find that the proposed operation is likely to violate the BMPs and impact water quality, they can consult with the operator, issue a directive, or when necessary a stop work order. Hanley added that DEC comments on the DPOs. Johnson asked what happens if a slide occurs. Freeman said that if there was a violation of the FRPA BMPs, DNR would be responsible for enforcement. If no BMPs were violated, it would be a legal matter between the homeowners and the forest landowner or operator. Johnson asked why the state wouldn't be liable. Hanley said that the homeowners could sue the state if they felt the state was negligent.

Johnson said that the Board of Forestry didn't accept the S&TC recommendations on public safety. Freeman explained that the Board first asked the S&TC to assess the extent of potential landslide hazards relative to public safety. That was the information that the S&TC provided to the Board in the scoping phase, and that information is now available to the public on-line. The S&TC did not make a recommendation on the decision whether or not to request new authority to address public safety under FRPA. After lengthy discussion, the Board decided not to request additional authority, but did ask the S&TC to review the existing standards to determine whether they adequately protected fish habitat and water quality with respect to landslides.

Palkovic noted that she has seen other operations where streams are used for drinking water. Operators are pretty good at taking extra steps for water quality protection. Hanley gave an example at Linkum Creek which is a water source for Kasaan. In that area, the operator left an additional buffer to the slope break above the creek. Unfortunately, the buffer blew down and increased debris clogged water filters. The operator was trying to do something good that backfired. Johnson stated that such backfires happen; there is a lack of understanding of catastrophic blowdown.

Burkhart said that if there's a DPO in an area with a permitted drinking water source, they are aware of it. People should be listed under a water rights permit from the DNR Division of Mining, Land, and Water. Hanley noted that such sources would only be listed if the user had applied for water rights, and then they still wouldn't have priority. However, a water rights permit does give notice to other users.

Moselle asked whether BMPs apply to unclassified streams under FRPA. Freeman explained that classified streams (e.g., Type I-A, I-B, etc.) have riparian areas, slope stability standards, and BMPs. The BMPs still apply to other, unclassified surface waters, but those waters would not have riparian buffers.

Johnson asked whether agency staff go door-to-door to find out what water sources are used. Hanley responded that most logging occurs outside residential areas. At Mitkof, DEC did raise the issue of streams that are likely used as drinking water. Freeman said that if people are downstream, it's generally assumed that there's some drinking water use.

“Frequently dissected slopes”

At the last meeting, there was a discussion of whether we need a more specific definition of “frequently dissected slopes.” Johnson reviewed the literature and talked with Doug Swanston on this issue. She said the “frequently” begs for a number definition, and suggested that it would be better to just say, “dissected slopes.” In the literature, the references are often to both frequency and magnitude of dissections. For example, a deep gully with many feeder hollows may have a history of slides and chronic failures. Where

there are many shallow incisions, lower magnitude slides often occur. We just need to note gullies and potential contributing areas from hollow and dissections. There is no good way to specify something like an area with “eight dissections per ½-mile is unstable.”

Landwehr generally agreed. He noted that the guide by Chatwin et al., 1994⁶ refers to “dissected” or “highly-dissected” slopes but doesn’t provide any quantitative measure.

Johnson said that the indicator is incised slopes, whether or not flowing water is present. Burkhart observed that 80% of Southeast Alaska slopes would fit that category. Johnson agreed that it could be a huge area. She also noted that Swanston said that the 50% gradient suggested in the indicators should be lowered to 45% if protection of public safety is the goal. Moselle said that such a change could be the difference between a 90% and 95% confidence level, and didn’t see the need to change it to a 45% gradient.

Baichtal asked how “frequently” is currently defined by the USFS. Landwehr said that the Alaska Region landform guide uses 10 dissections/mile, or an interfluvial distance <500’. However, that standard was developed as a hydrologic indicator for mapping, not necessarily for assessing landslide potential. Landwehr suggested a distance of ≤200-250’ or tree height between dissections for a definition of “frequently” for identifying unstable terrain. He added that the Chatwin, et al. 1994 guide has photographs of highly dissected slopes – we could use that as a reference.

Johnson said that Taain Creek on Mitkof Island has failed repeatedly due to multiple hollows, but the slope isn’t highly dissected.

Hanley referred back to the suggestion that if you can’t split-yard away from a dissection, it’s an indicator of a highly dissected area. He prefers “highly dissected” to “frequently dissected.”

Burkhart asked whether it is primarily roads or yarding that cause failures on dissected slopes. Landwehr answered that it can be either one, especially where there are deep till soils on a slope gradient >50%. On unstable terrain with helicopter yarding, the problem areas would be on steeper slopes (>67%) that have deep till and hollow(s) where the harvesting could change the hydrology and could cause destabilization.

Palkovic asked whether “deep till soils” should be on the list of indicators. Landwehr replied that hollows are more frequent on deep soils than on bedrock, but they occur on both types. Also, ash soils are very unstable and have many dissections.

Burkhart asked how “frequently dissected” can be identified when operators are working in the woods. Moselle suggested that it is a topic where training is needed. Landwehr added that the Chatwin guide asks the questions,

- Is the area dissected by gullies? (yes/no) If yes, how frequently?
- Is there evidence of past landslides?
- Where do gullies terminate?

Moselle and Palkovic suggested using “highly dissected” rather than “frequently dissected.” Johnson responded that any dissection is a concern.

⁶ Chatwin, S. C., D. E. Howes, J. W. Schwab, and D. N. Swanston. 1994. A guide for management of landslide-prone terrain in the Pacific Northwest. 2nd ed. British Columbia Ministry of Forests and U.S. Forest Service. 218 pp.

Burkhart said that the Chatwin guide is a good reference, but people wouldn't use it in the field. Freeman suggested that the key information could be conveyed through training, inclusion in the purple fieldbook on implementation of BMPs, through agency review of DPOs, or other approaches.

Hanley asked whether a 200' distance apart should be used as a rule of thumb. Moselle said spacing is only part of the frequency question. The other part is the number of dissections in the unit. He added that operator skill, experience, and equipment will play into their evaluation of the stability of the site. All this information would be good in a training environment.

Burkhart commented that he has worked in many difficult areas. He said that you can tell in the field when you are getting close to these areas, e.g., when felling a tree uproots adjacent trees. He understands what Johnson says about a situation where everything goes downhill. It depends on the overall picture. A single dissection out of a huge basin will eventually lead to turbidity, but you can't say all the private landowners can't operate because of that.

Johnson reiterated that "gullies" is a more understandable term than "dissections" – both should be included.

The S&TC concluded this discussion by agreeing to the following revised version of C3.

C3am. "Unstable slope or slide-prone area" means a slope or area, generally in excess of 50% gradient, where one or more of the following indicators may exist. Slide risk depends on the combination of factors at a given site.

- landslide scar initiation zones,
- jack-strawed trees,
- gullied or dissected slopes,
- a high-density of streams or zero-order basins (source basins for headwater streams), or
- evidence of soil creep.

The S&TC recognizes that slope dissection is a significant indicator of slide risk, but difficult to assess – closely spaced dissections are a red flag, as are few dissections that funnel to a common collecting area. The S&TC recommends that the procedures in Chatwin, et al., 1994 be referenced in assessing landslide risk. One rule of thumb for assessing frequency of dissection would be where dissections are so closely spaced that they preclude split-yarding. This distance is approximately equal to tree height.

The citation for Chatwin et al., 1994 is:

Chatwin, S. C., D. E. Howes, J. W. Schwab, and D. N. Swanston. 1994. A guide for management of landslide-prone terrain in the Pacific Northwest. 2nd ed. British Columbia Ministry of Forests and U.S. Forest Service. 218 pp.

Indicators of saturated soils on slopes.

At the last meeting, the S&TC agreed to consider a numeric standard for heavy rainfall. Johnson reviewed the literature, and talked with Doug Swanston. Swanston recommended a standard of 6" of rainfall in a 24-hour period. Landwehr noted that an earlier Swanston paper used 5" in 24 hours. Moselle asked whether the reference to ditchlines is necessary. Staunton replied that the ditchline is where water resides on the inboard side of a road. The soil we're worried about is on the slope above the road. When you observe a road with an unstable cut slope on a "wet" day, you'll see water coming out of

the slope and curdling a mudflow toward the ditchline. Moselle agreed that the indicators are OK as describe in **C9am**.

The S&TC concurred with the following amended version of **C9**.

C9am. With respect to blasting on steep or unstable slopes under 11 AAC 95.290(b)(3), the following indicators should be included to help operators determine when saturated soil conditions exist:

“Evidence of saturated soil conditions on a steep slope or unstable area may include:

- On cutslopes, noticeable soil liquefaction or movement of large soil particles to the ditchline
- Significant water flow evident on the surface, exposed bedrock, or impermeable hardpan
- Excavated or disturbed material performing in a liquid manner
- High rainfall rates in previous 24 hours, e.g., 6 inches in a 24-hour period, or prolonged periods of heavy rainfall
- Heavy rain following extended periods of freezing
- Heavy rain-on-snow events.”

These indicators apply to areas on slopes, not to muskegs. The S&TC does not recommend applying these indicators to the reference to saturated soil conditions in 11 AAC 365(d), Tracked and wheeled harvest systems.

Road construction BMPS under 11 AAC 290 (b)(3) and (d)

Summary: The S&TC did not reach consensus on the issue of whether or not to retain the clause, “and cause degradation of surface or standing water quality” in .290(d). The committee agreed to forward two options to the board as follows.

Option A. Leave the text of .290 (d) as is except for the change below:

“(d) An operator shall use end-hauling and full-bench construction techniques if mass wasting from overloading on an unstable slope or slide-prone area or erosion of sidecast material is likely to occur and cause degradation of surface or standing water quality.

Palkovic, Staunton, and Burkhart support this option. They believe that road construction issues are best addressed on a site-by-site basis, that end-haul/full-bench construction may also have landscape impacts, and that the existing and recommended BMPs provide the tools to address road proposals that have the potential to impact water quality or fish habitat.

Option B. change .290(d):

“(d) An operator shall use end-hauling and or full-bench construction techniques if
1) mass wasting from overloading on an unstable slope or slide-prone area is likely to occur, or
2) erosion of sidecast material is likely to occur and cause degradation of surface or standing water quality.”

Johnson and Hanley support this option. They believe that extent of impacts from road construction on an unstable slope or slide-prone area is unpredictable, and that road construction in areas where mass wasting is likely to occur should require end-hauling and full-bench construction to minimize landslide potential.

Moselle stated that either option is OK; fish habitat is protected under either option. Landwehr and Baichtal were indifferent with a slight preference for Option A. Landwehr stated that there would be little difference between the options in actual practice.

Discussion. The following section describes the discussion that resulted in these options.

At the November 1 meeting, the S&TC recommended changing 11 AAC 95.290 (b)(3) as follows:

“11 AAC 95.290. Road construction. [...]

(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(3) may not conduct excavation and blasting activities during saturated soil conditions.
[IF MASS WASTING IS LIKELY TO RESULT AND CAUSE DEGRADATION OF SURFACE OR STANDING WATER QUALITY.]”

The Committee then discussed whether or not the phrase “and cause degradation of surface or standing water quality” should also be deleted from .290 (d), which currently reads,

“(d) An operator shall use end-hauling and full-bench construction techniques if mass wasting from overloading on an unstable slope or slide-prone area or erosion of sidecast material is likely to occur and cause degradation of surface or standing water quality.”

Staunton commented that (b)(2) verbalizes in a BMP what good operators do already; they only move material as far as is necessary to achieve the construction objectives, and the experienced ones don’t build on sidecast material if the ground is unstable because it will cost more in the long run. Paragraph (b)(2) basically directs the operator to build a road that can be maintained. Staunton doesn’t think there is a conflict between sections (b)(2) and (b)(3).

Palkovic reiterated her earlier concern that on an unstable or slide-prone slope, a decision not to end-haul and use full-bench construction could be OK under (b)(2) but not under (d). Hanley said that if the “degradation” phrase is deleted, an operator must use end-haul and full-bench construction to mitigate slide risk.

Staunton commented that (b)(2) is trying to use BMPs to steer operators away from slide problems; in (d), if water quality effects are apparent, it currently says that you will use the specified techniques.

Landwehr observed that water quality protection underlies all of FRPA. Hanley said that changing (d) would address situations where you might not have water quality streams. Moselle added that there is also the issue of “impairment of productivity of land and water,” for which you should avoid mass wasting.

Palkovic said that if there is a ridge with no water below it, a slide might not get to a stream. Freeman also noted that the “impairment of productivity” clause only applies to public land, not private land.

Freeman suggested separating the two conditions by moving the reference to mass wasting into (b) (e.g., make it (b)(4)), and leaving just the surface erosion clause in (d). Staunton said that moving the mass wasting portion of (d) to (b)(4) implies that mass wasting impairs productivity and is not acceptable under any circumstances, but there are also benefits to wildlife habitat and possibly fish in some instances from mass wasting. Fish habitat impacts can be both positive and negative. Are we seeking to avoid all mass wasting?

Hanley said that splitting (d) would mean that if road construction is likely to cause mass wasting, you should avoid it.

Freeman asked whether the S&TC’s assumption is that all forestry-triggered mass wasting should be avoided. Landwehr said yes, when feasible. However, you need to recognize economic considerations. Full-bench construction and end-hauling are ugly on steep slopes unless crossing bedrock. It creates a major disturbance corridor in an effort to prevent landslides. There’s a tradeoff between the amount of

soil disturbance and avoidance of landslides. What is downslope – is there a bench? Is there fish habitat? If there is a bench, it might be appropriate to take that risk rather than changing the economics of harvesting. He agreed with Staunton and Palkovic. If there is a water quality issue, then to the extent feasible you need to avoid landslide impacts.

Palkovic said that avoiding landslides is part of FRPA along with balancing tradeoffs. There's an understanding that you should minimize what you trigger – that's desirable. She recommended leaving (d) as is, and is unsure about adding "or slide-prone area" to (d). She could go either way with that phrase.

Staunton said that keeping all of (d) tied to water quality impacts is appropriate. If you hit the wall where water quality impacts are likely, then full-bench and end-haul is what you are doing.

Moselle asked whether (d) should read, "An operator shall use end-hauling and/or full-bench construction techniques..." Palkovic said that the agencies have other avenues to do that through a variation. Moselle concurred.

Johnson asked whether there are areas where roads are not allowed under FRPA. Freeman said that there are no prohibitions except limitations on roads within riparian areas. Palkovic noted that DNR also works with operators on road location on a site-by-site basis.

Hanley raised the question of impairment of productivity of land and water, using the example of blast-induced slides at South Cholmondeley that ran into salt water. If the water quality clause is deleted from (d), that situation would be covered.

Staunton said that under (b)(3) with saturated soils and blasting in slide-prone areas, there is a high likelihood of moving large quantities of soil. A slide of some magnitude probably will happen, and you can't always know where the slide will go. You need to exercise discretion in this case.

Hanley and Johnson said that the water quality clause should be deleted from (d) because the BMP already refers to areas where slides are "likely to occur."

Palkovic said that if you're shooting a pit or road, there are one-time forces from blasting. That's different from road construction under (d). Changing (d) would change the construction techniques required, which is a long-term change.

Hanley commented that the Board of Forestry is likely to ask why the S&TC has recommended a different standard in .290(b)(3) and (d).

Johnson said that we should reduce slides when possible. Slides will occur.

Staunton said that FRPA uses the DPO process to describe a proposal, and then counsel the operator on how to comply, and if DOF thinks the operator can't comply we give them feedback, and we can do that at various points. Blasting is either on or off, and you don't always know the likely result because rock and soil is not homogeneous. When building a road you can change as you go along and deal with evolving conditions. We need to leave some flexibility. Blasting doesn't occur all the time – there are windows for it, and sites where it can and can't happen. Once you shoot, you can't take it back. Hanley agreed. Palkovic added that with saturated conditions, the soil is more fluid, and has more ability to move. Blasting also has a smaller footprint. There is less harm to the operator with waiting for unsaturated conditions.

Johnson countered that blasting liquefies soils when they are near saturation.

Moselle asked why we accept no slides under the blasting BMP. Freeman said that she heard committee members state that the likely size of a slide, the fluidity of the soil, and the options to mitigate by waiting were reasons cited. Landwehr stated that we want to minimize man-induced slides to the extent possible. Sections (b)(3) and (d) are two different measures aimed toward the same goal. Blasting vibrates the bedrock – that is not like an operator in a backhoe where the operator can control what they’re getting into. Once you touch a blast off, your control is gone. Waiting a day or two for soils to dewater is much less expensive than end-hauling and full-bench construction. Palkovic added that there is potential to generate more sediment with blasting. Leaving (d) as is allows us to tailor road construction to the site. Moselle commented that road construction under (d) is a long, linear impact versus a point source with blasting under (b)(3).

Johnson said that the S&TC should recommend full-bench construction on really steep slopes. It’s prudent. Palkovic emphasized that the language under (d) isn’t a recommendation – it says “shall”, its mandatory. The agencies can recommend full-bench construction, and have at times in the past.

Staunton said that these are BMPs. In enforcement you are going to have trouble bringing a violation and reconstructing conditions after the fact. We are trying to steer operators into making an intelligent choice so that we don’t have to do enforcement. If an operator wants to harvest on steep ground, we can best steer them through training, review of DPO notifications, and inspections. The benefit of full-bench construction depends on the bedrock plain – some areas of rotten rock could still give out. It gets back to professional judgment, common sense, and FRPA obligations.

Landwehr asked how likely it is that operators on private land would not use full-bench construction on slopes >67%. Palkovic and Staunton said that it is not likely. Staunton added that an operator looks for small benches to build on for roading a steep slope. If the road would cross a sustained slope >67%, you’re going to rethink it unless it’s fantastic timber – otherwise an operator won’t be able to afford it.

Moselle noted that (d) applies to lower slopes if they are unstable or slide-prone and water quality degradation is likely.

Johnson asked what tolerance we have to man-induced slides where there aren’t water quality issues. Staunton said that water quality concerns will exist in most slide areas.

Hanley and Johnson stated that we need a better understanding of the list of slides, and what properties are associated with water quality. Johnson doesn’t think water quality is always protected because people don’t fully understand water quality issues. Staunton said that concern goes back to the need for training.

Johnson recounted that she had worked with Landwehr on a slide study in 1993, and every slide hit some kind of water body. Some water bodies were created by the slides – they went from zero-order hollows to perennial streams that probably still exist.

Johnson stated that we agree we can’t stop all landslides. Are we going to work on reducing slides from roads and harvesting? What risk is acceptable for fish habitat and water quality?

Landwehr asked whether all turbid water is a violation of water quality standards. Johnson said that all slides will cause turbidity. Some will go into ponds or muskegs. Impacts are mitigated downstream.

Moselle explained that if DEC and ADF&G go out and find problems with water quality or fish habitat, we can deal with that with no changes to the regulations. If we’re trying to tie all slides to water quality, we haven’t solved all that. The consensus points are at the intersection of science and policy. Moselle recommended that the S&TC follow the sequence of avoid – minimize – mitigate. With the blasting

standard in (b)(3), it is easy and appropriate to avoid blasting during saturation. Road construction on unstable or slide-prone slopes is not as easily avoided, so you work to minimize the problems as done under (b)(2) with balancing cuts and fills. At (d) we go to a further step of requiring end-hauling and full-bench construction in areas where degradation is likely. Do we want to make the jump to requiring end-hauling before there's a "likely to occur" event for water quality?

Johnson said that we don't know ahead of time about water quality impacts. Burkhart replied that any road construction has water quality impacts. We need to move on – you can't go anywhere unless you decide to quit building roads, especially on private lands.

Training needs

Hanley said that only Sealaska provides maps of steep and slide-prone areas with their DPOs. Freeman noted that training on identification of these areas and data available to help identify them is included in the training list.

Johnson recommended improving understanding of the connection of FRPA to water quality standards. Palkovic noted that she also reviews DNR water rights files when reviewing DPOs to identify known drinking water supplies. If people haven't applied for water rights, that information may not be known. Burkhart stated that water quality has to be protected, especially if there are people downstream, but it is better to have the information already recorded through water rights.

Johnson recommended training on identifying potential slide runout zones so that operators can assess whether a slide would likely hit a stream, water source, or fish creek. Burkhart noted that there are some good photos of slide runouts in the Chatwin guide. That would show people what slide runouts look like.

The Committee concurred with the following list of training needs.

C10. Training needs include,

- Identification and mapping for DPOs of "unstable slopes and slide-prone areas,"
 - information available from the scoping maps, digital elevation models, and other sources to identify and map these areas
 - All indicators listed under this definition
 - Which slopes <67% are unstable or slide-prone
- Identification of "saturated soils" and understanding of the indicators for saturation on slopes
- Assessment of likely runout zones for potential slides (e.g., see Chatwin et al., 1994 for illustrations)
- Connection between FRPA standards and water quality standards, and sources of information on water uses
- Any changes adopted in regulation or made to the DPO form.

The S&TC completed a review of the full package of consensus points, and concurred with points C1 – C9 and C11. For C10, the S&TC forwards two options to the board as described under the section on *Road construction BMPs under 11 AAC 95.290(b)(3) and (D)* above.

Next meeting: December 8, 8:30-9:30 Web conference

- Consider additions to the bibliography regarding Net Map
- Review Minutes from November 23, 2010

To Do

Freeman

- Send minutes #2 to the public mailing list and Board when final.
- Draft minutes #3 and send to S&TC
- Send final consensus points to S&TC
- Update bibliography and send to S&TC

Johnson

- Review literature for references to NetMap methodology.

Handouts

- Agenda
- Draft minutes from November 23, 2010 meeting
- Updated consensus points
- Updated Draft S&TC Recommendations



Minutes

FRPA Phase 2 Landslide Science & Technical Committee (S&TC)

Meeting #4 – December 8, 2010

Web meeting – Anchorage, Juneau, Ketchikan, Seattle

S&TC Attendees:

Ketchikan: Pat Palkovic

Juneau: Kevin Hanley, Adelaide (Di) Johnson, and Kyle Moselle

Anchorage: Marty Freeman and Greg Staunton

Seattle: Bert Burkhart

Absent: Dennis Landwehr, Jim Baichtal

Bibliography

Johnson proposed adding two publications and a website to the bibliography. All three references cover the NetMap methodology. It is beneficial to look at a landscape model for risk assessment. NetMap can analyze various topics in detail, e.g., fish habitat for individual species.

- Benda, L., D. J. Miller, K. Andras, P. Bigelow, G. Reeves, and D. Michael. 2007. NetMap: A new tool in support of watershed science and resource management. *Forest Science* 52:206-219.
- Benda, L., D. Miller, S. Lanigan, and G. Reeves. 2009. Future of applied watershed science at regional scales. *EOS, Transaction American Geophysical Union* 90:156-157.
- website: www.netmaptools.org

Johnson recommended the website www.earthsystems.net/temp/Benda_presentation4.ppt as an introduction to NetMap capabilities, specifically slides 9, 10, and 12 dealing with stability.

Bert asked where NetMap comes from. Johnson said that Lee Benda from Earth Systems Institute was the lead and Dan Miller did most of the programming. Earth Systems is a private company. Benda has worked in Washington, Oregon, California, Alaska, and overseas.

Moselle asked whether Johnson had read the references. Johnson said she hadn't read them closely.

Hanley said that NetMap is a "Cadillac" approach. The state doesn't have funding for it, but he wishes the USFS would use it in Alaska. Johnson noted that it has been used at some sites in the Tongass, and Gordon Reeves from the USFS is going to use it for analyses in the Copper River Delta. The NetMap models use basic principles for determining slide initiation and runout, but apply them to the watershed level. The approach is based on published documents on landscape processes.

Moselle asked whether there are any peer reviewed papers assessing the pros and cons of NetMap by people other than the model developers. Johnson said she would check the literature and report back to the S&TC.

Johnson reported that she asked Lee Benda to share NetMap information from a zone in Alaska for comparison to the scoping model developed by the S&TC, and he provided information from Mitkof Island. In general, the hazard areas identified look pretty similar. The NetMap version is more detailed, even though they used the 30-meter digital elevation model to produce the map.

Burkhart reiterated that he would like to know more about the methodology. Who uses it and where? Is it used by more than one group? Hanley noted that USFS Region 6 has used it extensively. Johnson said that it is a modeling exercise, a tool to identify initiation and runout zones to analyze potential impacts.

The committee concluded that the published references are peer-reviewed and should be included in the Miscellaneous section of the bibliography. The S&TC is just including the papers as information, not a specific recommendation.

Consensus point 5am. Freeman noted that the previous version of the S&TC consensus points included the recommended definition for "unstable fill material", but inadvertently omitted the recommendation to amend 11 AAC 95.290(b)(2) to use this term.

Moselle noted that .290 needs to be reworded to use the same phrase. The committee agreed to the following wording:

C5am. Add the following term to the definitions in 11 AAC 95.950: "**Unstable fill material**" means organic debris, organic soil, or fine-textured mineral soils. A fine-textured soil has a texture of silty-clay, sandy-clay, or clay.
Change .290(b)(2) as follows: **95.290(a);**
"11 AAC 95.290. Road construction. [...]
(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]
(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, unstable fill material may not be used [IF IT IS UNSTABLE, FINE TEXTURED, OR PRONE TO MASS WASTING] and cuts must be minimized where fine textured soils are known or encountered; "

The S&TC briefly discussed whether "may not" should be changed to "shall not" in .290(b)(2). Freeman recommended consulting with the Attorney General's Office on the proper terminology for "shall" vs. "may" in regulation. She will check with the Attorney General's Office.

Next steps

Freeman described the rest of the FRPA review process:

- Draft minutes of today's meeting will be sent to the S&TC this morning.
- Final S&TC minutes, bibliography, consensus points, regulation recommendations will be sent to the S&TC, Board of Forestry, and public mailing list
- The Board of Forestry reviews the process and recommendations on December 13.
- If the Board endorses the recommendations, DOF will convene an Implementation Group
- Implementation Group recommendation will be reviewed with the Board of Forestry.
- If the Group's recommendations are approved, DOF proceed with regulation process, handbooks, training, etc.

To Do:

Freeman

- Send final Minutes from Nov. 23 and Dec. 8 meeting, bibliography, consensus points and recommendations to the Board of Forestry, S&TC, and public mailing list. (done 12/7/10 and at Board meeting)
- Brief the Board of Forestry on the S&TC process, consensus points, and options for .290(d) (done 12/13-14/10)
- Check with the AGO on "shall" vs "may" (in progress)

Johnson

- Check literature for publication on NetMap by other authors than the model developers

FRPA and Water Quality Standards Briefing

November 2010

Key Points

- 1) The Alaska WQS are based on designated uses for the waterbody; however, the most stringent use class criteria must apply. For fresh water uses, the standards for drinking water are the most stringent and, therefore, are the standards that must be met.
- 2) Fish habitat is one of the list of possible designated uses, called “Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife” in the WQ regulations. This category is broadly applied to anadromous and resident fish streams. However, unless a stream or other water body is officially reclassified for that use, the WQS for drinking water are the standards that must be met. Few streams are reclassified for other uses.
- 3) DEC sets the WQS for Alaska. WQS have specific standards for sediment and turbidity (as well as temperature, toxics, and other parameters) for streams designated for fish habitat, though the standards for drinking water are the standards that must be met.
- 4) FRPA and the WQS are linked. DEC co-signs the FRPA regulations because they are the forestry BMPS for non-point source pollution control in Alaska. FRPA provides the enforcement mechanism for violation of WQS due to forest practices.
- 5) For implementation of FRPA, DNR is the lead agency, but must give “due deference” to DEC for water quality issues on all land ownerships.

For example, under the FRPA regulations, 11 AAC 95.285 (b) Road location, says that roads “must be designed and located to minimize significant adverse effects on fish habitat and water quality.” One of the factors in determining whether there were “significant adverse effects” would be to evaluate whether the forest road construction caused exceedences of the WQ standards for drinking water. If so, the FRPA tools of directives, stop work orders, notices of violations, and fines could be used to address the problem.

References

Statutes

Sec. 41.17.010. Declaration of intent. The legislature declares that [...]

(5) under the leadership of the Department of Environmental Conservation as lead agency, the state should exercise its full responsibility and authority for control of nonpoint source pollution with respect to the Federal Water Pollution Control Act, as amended;

(6) subject to AS 41.17.098(c), the provisions of this chapter, and regulations adopted under this chapter, with the approval of the Department of Environmental Conservation, establish the nonpoint source pollution requirements under state law and Sec. 319 of the Clean Water Act for activities subject to this chapter;

Sec. 41.17.055. Powers and duties of the commissioner. [...]

(d) The commissioner may develop regulations under this chapter as part of the state program for control of nonpoint source pollution under the Federal Water Pollution Control Act, as amended. However, the Department of Environmental Conservation is the lead agency for water

quality and control of nonpoint source pollution under that Act, and the regulations are therefore subject to the approval of the commissioner of environmental conservation.

Sec. 41.17.060. Regulatory and administrative standards. [...]

- (b) With respect to state, municipal, and private forest land, the following standards apply: [...]
(5) significant adverse effects of soil erosion and mass wasting on water quality and fish habitat shall be prevented or minimized.

Sec. 41.17.098. Interagency coordination and reevaluation. [...]

(c) The commissioner shall give due deference to the Department of Environmental Conservation in decisions concerning water quality. The commissioner of environmental conservation retains the authority to adopt nonpoint source pollution regulations for activities subject to this chapter to the extent that regulations are not adopted by the commissioner of natural resources and approved by the commissioner of environmental conservation under this chapter. The commissioner of environmental conservation may withdraw approval of regulations adopted by the commissioner of natural resources under this chapter by following the procedure for the adoption, amendment, and repeal of regulations under AS 44.62.180 - 44.62.290.

(d) The commissioner shall recognize the expertise of the Department of Fish and Game with regard to fish and wildlife habitat. On private land, the commissioner shall give due deference to the Department of Fish and Game regarding effects on fish habitat from timber operations including variations to riparian standards, designation of alternative site-specific riparian protection plans, and road location decision within riparian areas. On public land, the commissioner shall give due deference to the Department of Fish and Game regarding effects on fish and wildlife habitat from timber operations including timber harvest in riparian areas, variations to riparian standards, and road location decisions within riparian areas. In making decisions under AS 41.17.087, the commissioner shall recognize fish habitat as the primary value in riparian areas.

(e) In this section, "due deference" means that deference that is appropriate in the context of the agency's expertise and area of responsibility and all the evidence available to support a factual assertion. Where due deference is given, if the commissioner does not agree with a commenting agency, the commissioner shall prepare a written statement of the reasons for the disagreement.

(f) If a disagreement described in (e) of this section exists, an officer of an agency may require reevaluation of the disagreement at a higher level within the agencies, or by the governor if necessary, before a decision is made by the commissioner.

Sec. 41.17.115. Management of riparian areas; regulations. (a) The commissioner shall protect riparian areas from the significant adverse effects of timber harvest activities on fish habitat and water quality. The management intent for riparian areas is the adequate preservation of fish habitat by maintaining a short- and long-term source of large woody debris, stream bank stability, channel morphology, water temperatures, stream flows, water quality, adequate nutrient cycling, food sources, clean spawning gravels, and sunlight. [...]

Regulations

11 AAC 95.900 (20) "degradation of water quality" means a decrease in water quality such that the affected waters are unable to fully maintain existing or designated uses; "degradation of

water quality" does not include changes that are temporary, localized, and reparable decreases in water quality; in this paragraph

- (A) "reparable" means an effect on, or change to, a use or aquatic system due to a decrease in water quality that is reversible by natural processes such that the use or system will return to a state functionally identical to the original;
- (B) "temporary" means 48 hours or less with respect to existing uses;

11 AAC 95.950 (22) "designated uses" means those protected water uses specified in 18 AAC 70.020 for each water body or segment of a water body;

11 AAC 95.950 (82) "surface waters" means fresh water springs, lakes, or ponds, or a freshwater stream the designated uses of which are protected under 18 AAC 70 [DEC water quality standards], regardless if those waters are classified under AS 41.17.950(31) – (41);

11 AAC 95.185. Purpose and relationship to other laws. (a) This chapter implements and interprets AS 41.17 (Forest Resources and Practices). For land outside riparian areas, the purpose of this chapter is to provide protection of important public resources, maintain an economically viable timber industry, *prevent or minimize significant adverse effects of soil erosion and mass wasting on water quality and fish habitat*, and ensure reforestation to the fullest extent practical, taking into account the economic feasibility of timber operations. For riparian areas, the purpose of this chapter is to *protect these areas from significant adverse effects of timber harvest activities on fish habitat and water quality*, taking into account the economic feasibility of timber operations.

(b) For all lands, the operations recognized under this chapter shall be conducted in a manner that does not cause or constitute a substantial factor in causing a *degradation of water quality*.

11 AAC 95.255. Corrective action. On private forest land, state forest land, and other public land as defined in AS 41.17.950, if an operation is resulting, or is likely to result, in a *degradation of water quality*, notwithstanding compliance with the best management practices established in this chapter, the state forester, with due deference to the Department of Environmental Conservation, will direct the operator, forest landowner, or timber owner to correct the degradation through the use of a directive or stop work order as provided for under AS 41.17.136 and AS 41.17.138. Failure to comply with a directive or stop work order issued under this section shall subject the violator to a penalty under AS 41.17.131.

11 AAC 95.265. Classification of surface water bodies. (a) Classification of surface water bodies by an operator or by an agency must be made according to the following criteria:

- (1) on private land in Region I, classification of surface waters into Type I-A, I-B, I-C or I-D must be made in accordance with AS 41.17.950(31) – (34) using the procedures established in this section; any surface waters that do not meet the criteria set out in AS 41.17.950(31) – (34) do not have a riparian area, within the meaning given the term in AS 41.17.950, but are subject to surface water quality protection best management practices in accordance with this chapter;
- (2) on private land in Region II, classification of surface waters into Type II-A, II-B, II-C, or II-D must be made in accordance with AS 41.17.950 (35)-(38) using the procedures established in this section; any surface waters that do not meet the criteria set out in AS 41.17.950(35)-(38) do not have a riparian area, within the meaning given the term in AS

- 41.17.950, but are subject to surface water quality protection best management practices in accordance with this chapter;
- (3) on private land in Region III, classification of surface waters into Type III-A, III-B, or II-C must be made in accordance with AS 41.17.950(39) – (41) using the procedures established in this section; any surface waters that do not meet the criteria set out in AS 41.17.950(31) – (33) do not have a riparian area, within the meaning given this term in AS 41.17.950, but are subject to surface water quality protection best management practices in accordance with this chapter;
 - (4) on other public land and on state land managed by the department in Region I, classification of surface waters must indicate whether the surface waters are anadromous or contain high value resident fish under AS 41.17.950;
 - (5) on other public land and on state land managed by the department in Regions II and III, classification of surface waters into Type II-A, II-B, II-C, II-D, III-A, III-B, or III-C must be made in accordance with AS 41.17.950 (35) – (41).

11 AAC 95.290. Road construction. [...]

- (b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]
 - (3) may not conduct excavation and blasting activities during saturated soil conditions if mass wasting is likely to result and cause ***degradation of surface or standing water quality***. [...]
- (d) An operator shall use end-hauling and full-bench construction techniques if mass wasting from overloading on an unstable slope or erosion of sidecast material is likely to occur and cause ***degradation of surface or standing water quality***.
- (e) Notwithstanding the provisions of 11 AAC 95.355, when constructing a forest road, an operator shall, where feasible, fell trees away from fish-bearing surface waters and from standing waters, and shall fell trees away from other surface where feasible and if necessary to avoid ***degradation of water quality***. An operator shall comply with the following standards when constructing a forest road: [...]
 - (3) if a tree is felled into nonfish-bearing surface waters and standing waters, the operator shall remove debris at the earliest feasible time when necessary to avoid ***degradation of water quality***.
- (f) A winter road must be constructed to avoid ***degradation of water quality*** and where feasible the alteration of drainage systems.
[...]
- (i) The division may physically block or otherwise seasonally prohibit vehicle traffic on winter roads if necessary to prevent significant roadbed degradation or ***surface water siltation***.
[...]
- (k) **Where feasible, the running surface of a road must use material that will minimize erosion of the road surface and prevent *degradation of water quality*.** [...]

11 AAC 95.295. Road drainage. (a) This section sets out the drainage standards that apply to a forest road.

- (b) An operator shall minimize the erosion of a road bed, cut bank, and fill slope through the use of cross drains, ditches, relief culverts, bridges, water bars, diversion ditches, or other structures demonstrated to be effective. These drainage structures shall be installed at all natural drainages and must be spaced at least as frequently as set out in the following table:

SPACING OF DRAINAGE STRUCTURES (in feet)

PERCENT OF GRADE	REGION I	REGION II AND III
0 to 2	Meet other standards of this section	
2 to 7	1,000	1,500
8 to 15	800	1,000
Over 15	600	800

More frequent drainage structure spacing or other drainage improvements must be used where site-specific conditions of peak flows or soil instability makes additional drainage structures necessary to prevent *degradation of standing or surface water quality*. Less frequent drainage spacing is permissible if the parent material of the roadway is not erodible, such as rock or gravel; the topography or other local conditions are not conducive to erosion; or the *degradation of surface or standing waters* is not likely to occur. [...]

11 AAC 95.315. Road maintenance. [...]

(e) If necessary to prevent significant *degradation of surface water quality or fish habitat*, the division will, in its discretion, require an operator or forest landowner to perform the following activities:

- (1) install additional or larger culverts or other drainage improvements as determined necessary by the division;
- (2) provide additional road maintenance;
- (3) close an inadequately maintained portion of the road system in accordance with 11 AAC 95.320; and
- (4) rehabilitate unstable or erodible exposed soils by a suitable method to minimize siltation of surface waters. [...]

11 AAC 95.320. Road closure. [...]

(d) At the conclusion of temporary winter road use, the operator shall close roads as necessary to avoid *degradation of water quality* and significant erosion of soils and organic material. Techniques for closing temporary winter roads may include creating runoff breaks in snow berms, using slash debris on road surfaces, installing water bars, or using other techniques demonstrated to be effective.

(e) If *degradation of water quality* occurs due to erosion from a closed road, the forest landowner, the operator, or the person responsible for creating the condition shall correct the problem. [...]

11 AAC 95.325. Material extraction and disposal sites. [...]

(e) If *degradation of water quality* occurs due to erosion from an abandoned material extraction or disposal site, the forest landowner, the operator, or the person responsible for creating the condition, must correct the problem.

11 AAC 95.345. Landing location, construction, and operation. [...]

(b) An operator shall locate and construct a landing according to the following standards: [...]
(7) any excavated material from the construction of a landing may not be placed where it is likely to result in *degradation of surface water quality*. [...]

11 AAC 95.350. Bank integrity. [...]

(d) The division will, in its discretion, require stabilization, to the extent feasible, of disturbed banks to prevent soil erosion and *degradation of water quality*.

11 AAC 95.355. Felling and bucking. [...]

(c) If a tree is felled into nonfish-bearing surface or standing waters, the operator shall remove the tree and its debris at the earliest feasible time, to the extent necessary to avoid *degradation of water quality*. [...]

11 AAC 95.360. Cable yarding. (a) During yarding, an operator shall keep a log fully suspended above or yarded away from surface waters where feasible, in light of the necessary equipment being reasonably available to the operator and the importance of the surface water to fish habitat and water quality, unless full suspension or split yarding would likely cause greater *degradation of surface water quality* or impact to fish habitat than cross-stream yarding. [...]

11 AAC 95.365. Tracked and wheeled harvest systems. [...]

(c) Any debris that may enter surface waters from that part of a winter trail located over those surface waters must be removed by the operator before thaw to the extent necessary to avoid *degradation of water quality*. During winter logging, substantial concentrations of debris that may enter surface waters must be removed before thaw.

(d) An operator may not use a tracked skidder, a wheeled skidder, or a logging shovel during saturated soil conditions if *degradation of surface and standing water quality* is likely to result. [...]

(f) When using tracked and wheeled vehicles, an operator shall

(1) use puncheon where significant ground disturbances may contribute to sedimentation of surface water;

(2) locate skid trails to minimize *degradation of surface water quality*;

(3) use water bars or other appropriate techniques as necessary to prevent or minimize sedimentation;

(4) keep skid trails to the minimum feasible width; and

(5) outslope skid trails where feasible, unless an inslope is necessary to prevent logs from sliding or rolling downhill off the skid trail. [...]

(h) An operator may not use a tracked or wheeled skidder on a slope where this method of operations is likely to cause *degradation of surface and standing water quality*.



Landslide Standards Implementation Group Members

Expertise	Name	Contact info	E-mail	Phone
DNR-DOF	Marty Freeman	DNR Division of Forestry 550 W. 7 th Avenue, Suite 1450 Anchorage, AK 99501	Marty.freeman@alaska.gov	276-3749
DNR-DOF	Greg Staunton	DNR Division of Forestry 2417 Tongass Avenue Suite 213 Ketchikan, Alaska 99901	greg.staunton@alaska.gov	225-3070
DNR-DOF	Pat Palkovic	DNR Division of Forestry 2417 Tongass Avenue Suite 213 Ketchikan, Alaska 99901	pat.palkovic@alaska.gov	225-3070
DEC-WQ	Kevin Hanley	DEC Division of Water 410 Willoughby Ste 303, PO Box 111800 Juneau, AK 99801-1800	Kevin.hanley@alaska.gov	465-5364
ADF&G-Habitat	Kyle Moselle	ADF&G Habitat Division PO Box 110024 Juneau, AK 99811-0024	Kyle.moselle@alaska.gov	465-4287
Commercial Fishing	Mark Vinsel	United Fishermen of Alaska 211 Fourth Street, Suite 110 Juneau, AK 99801	Ufa1@ufa-fish.org	586-2820
ANCSA Regional Corporation	Ron Wolfe	Sealaska Corporation One Sealaska Plaza, Suite 400 Juneau, AK 99801	Ron.wolfe@sealaska.com	586-9277
ANCSA Village Corporation	Mary Edenshaw	Chief Operations Officer Klawock-Heenya Corporation P.O. 129 Klawock, AK 99925-0129	khc@aptalaska.net	755-2270
Sport Fishing	Mark Kaelke	Trout Unlimited 9723 Trappers Lane Juneau, AK 99801	mkaelke@tu.org	321-4464
Trust Land Owner	Paul Slenkamp	Mental Health Trust Land Office 2030 Sealevel Drive Ketchikan, AK 99901	Paul.slenkamp@alaska.gov	227-6618 office 617-8216 cell
Municipality-Borough	Bill Rotecki	Ketchikan Gateway Borough P.O. Box 1399 Ward Cove, AK 99928	billr@kgbak.net	247-8189
Municipality-City	Karl Hagerman	Acting City Manager City of Petersburg P.O. Box 329 Petersburg, AK 998933	ppwdir@ci.petersburg.ak.us	772-4430 x35

Conventional Timber Operator/Road- builder	Bob Girt	Higher Ground Pursuit consulting 6598 Vista Drive Ketchikan, AK 99901	highergroundpursuit@gei.net	617-5886 (c) 225-8643 (h)
Helicopter Timber Operator	Bert Burkhart	Columbia Helicopters P.O. Box 7055 Ketchikan, AK 99901	bertb@colheli.com	225-7879 w 503-709- 0313 c
Water users	See Mary Edenshaw above	Klawock Watershed Council		

Consensus Points – S&TC and IG September 30, 2011

The consensus points from the Science & Technical Committee are in black type; consensus points from the Implementation are in blue type.

S&TC C1. For the purposes of the FRPA and its regulations, define both “landslide” and “mass wasting” using the definition under 11 AAC 95.900 (44):

"mass wasting" means the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity.

IGC 1. The Implementation Group concurs without change.

S&TC C2. Change the terms “unstable slope” and “unstable or slide-prone slope” to “unstable slope or slide-prone area” wherever they appear in the regulations. [Note: this amends the term used in 11 AAC 95.220(a)(9)(A) and .290(d)(2).]

IGC C7. Use the term “unstable area” with regard to the DPO, and use the term “unstable slope” in the other BMPs requiring specific actions. (See definitions in IGC C8)

S&TC C3am. “Unstable slope or slide-prone area” means a slope or area, generally in excess of 50% gradient, where one or more of the following indicators may exist. Slide risk depends on the combination of factors at a given site.

- landslide scar initiation zones,
- jack-strawed trees,
- gullied or dissected slopes,
- a high-density of streams or zero-order basins (source basins for headwater streams), or
- evidence of soil creep.

The S&TC recognizes that slope dissection is a significant indicator of slide risk, but difficult to assess – closely spaced dissections are a red flag, as are few dissections that funnel to a common collecting area. The S&TC recommends that the procedures in Chatwin, et al., 1994 be referenced in assessing landslide risk. One rule of thumb for assessing frequency of dissection would be where dissections are so closely spaced that they preclude split-yarding. This distance is approximately equal to tree height.

The citation for Chatwin et al., 1994 is:

Chatwin, S. C., D. E. Howes, J. W. Schwab, and D. N. Swanston. 1994. A guide for management of landslide-prone terrain in the Pacific Northwest. 2nd ed. British Columbia Ministry of Forests and U.S. Forest Service. 218 pp.

IGC C8 Revise 11 AAC 95.220 (a)(9)(A) as follows:

“(9) the following slope information for areas that are located in cutting units or traversed by roads:

(A) any known unstable [OR SLIDE-PRONE SLOPE] area. For the purposes of identifying unstable areas under this section, consider sites with slopes generally in excess of 50% gradient, where one or more of the following indicators may exist.

- landslide scars,
- jack-strawed trees,
- gullied or dissected slopes,
- a high-density of streams or zero-order basins (source basins for headwater streams), or
- evidence of soil creep.”

For the regulations that require specific actions in BMPs (11 AAC 95.290, .340, .345, .360, and .365) use the term “unstable slope” and add a definition to the regulations :

“Unstable slope” means a slope exhibiting mass wasting or where mass wasting is likely to occur.”

"Mass wasting" is already defined in the regulations as “the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity.”

The IG agreed unanimously that these indicators of unstable slopes are helpful and should be included in training for agencies and operators. They did not agree on whether they would best be located in the regulations or in the BMP implementation field book (“purple book”).

For the purposes of identifying unstable slopes, consider sites with slopes generally in excess of 50% gradient, where one or more of the following indicators may exist.

- landslide scars,
- jack-strawed trees,
- gullied or dissected slopes,
- a high-density of streams or zero-order basins (source basins for headwater streams), or
- evidence of soil creep.”

S&TC C4. Leave the term “high risk of slope failure” in 11 AAC 95.280 (d)(1) unchanged.

IGC2. The Implementation Group concurs without change.

S&TC C5am. Add the following term to the definitions in 11 AAC 95.950: “**Unstable fill material**” means organic debris, organic soil, or fine-textured mineral soils. A fine-textured soil has a texture of silty-clay, sandy-clay, or clay.

Change .290(b)(2) as follows:

11 AAC 95.290. Road construction. [...]

“(b) If constructing a road on a slope greater than 67 percent, on an unstable slope[, OR IN A SLIDE-PRONE AREA] is necessary, an operator [...]

(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, unstable fill material may not⁷ be used [IF IT IS UNSTABLE, FINE TEXTURED, OR PRONE TO MASS WASTING] and cuts

must be minimized where fine textured soils are known or encountered; “

IGC3am. The Implementation Group supports S&TC C5am with the deletion of “slide-prone area”:

Add the following term to the definitions in 11 AAC 95.950: “**Unstable fill material**” means organic debris, organic soil, or fine-textured mineral soils. A fine-textured soil has a texture of silty-clay, sandy-clay, or clay.”

Change .290(b)(2) as follows:

11 AAC 95.290. Road construction. [...]

(b) If constructing a road on a slope greater than 67 percent, or on an unstable slope [, OR IN A SLIDE-PRONE AREA] is necessary, an operator [...]

(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, unstable fill material may not be used [IF IT IS UNSTABLE, FINE TEXTURED, OR PRONE TO MASS WASTING] and cuts must be minimized where fine textured soils are known or encountered;

S&TC C6.

Add to **11 AAC 95.360 Cable yarding: [...]**

(c) The following standards apply to cable yarding operations: [...]

(6) on unstable slopes or slide-prone areas, an operator shall minimize disturbance to soils, understory vegetation, stumps, and root systems.

IGC4am. The IG concurs with inserting in **11 AAC 95.360**, but deletes “or slide-prone areas.”

Add to **11 AAC 95.360 Cable yarding: [...]**

(c) The following standards apply to cable yarding operations: [...]

(6) on unstable slopes, an operator shall minimize disturbance to soils, understory vegetation, stumps, and root systems.

S&TC C6, cont.

Add to **11 AAC 95.360 or .340:** In these areas, an operator should consider partial cuts, helicopter yarding, retention areas, or other techniques designed to meet these objectives.

IGC5am. Revise as follows and insert in **11 AAC 95.340**, Harvest unit planning and design:

To minimize disturbance to soils, understory vegetation, stumps, and root systems on unstable slopes, an operator should consider techniques such as partial cuts, retention areas, and use of helicopter or skyline systems to achieve full suspension of logs.

S&TC C7.

Add to **11 AAC 95.365. Tracked and wheeled harvest systems:** (a) A person may not skid timber or operate construction equipment or machinery in a water body catalogued as anadromous under AS 16.05.871, without written approval of the Department of Fish and Game, or in any other surface waters, marshes, [OR]non-forested muskegs, or unstable slopes or slide-prone areas without prior notice to the division except, that equipment may be operated on frozen surface waters, marshes, or non-forested muskegs without prior notice to the division.

IGC6am. Concur with revision but delete “or slide-prone area.”

Add to **11 AAC 95.365. Tracked and wheeled harvest systems:** (a) A person may not skid timber or operate construction equipment or machinery in a water body catalogued as anadromous under AS 16.05.871, without written approval of the Department of Fish and Game, or in any other surface waters, marshes, [OR]non-forested muskegs, or on unstable slopes without prior notice to the division except, that equipment may be operated on frozen surface waters, marshes, or non-forested muskegs without prior notice to the division.

S&TC C8. Edit 11 AAC 95.290(b)(3) to prohibit blasting in saturated soil conditions:

“(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(3) may not conduct excavation and blasting activities during saturated soil conditions.
[IF MASS WASTING IS LIKELY TO RESULT AND CAUSE DEGRADATION OF SURFACE OR STANDING WATER QUALITY.]

The IG did not reach consensus on this item and deferred to the Board’s August 31, 2011 unanimous recommendation to retain the existing language without the change recommended by the S&TC.

S&TC C9am. With respect to blasting on steep or unstable slopes under 11 AAC 95.290(b)(3), the following indicators should be included to help operators determine when saturated soil conditions exist:

“Evidence of saturated soil conditions on a steep slope or unstable area may include:

- On cutslopes, noticeable soil liquefaction or movement of large soil particles to the ditchline
- Significant water flow evident on the surface, exposed bedrock, or impermeable hardpan
- Excavated or disturbed material performing in a liquid manner
- High rainfall rates in previous 24 hours, e.g., 6 inches in a 24-hour period, or prolonged periods of heavy rainfall
- Heavy rain following extended periods of freezing
- Heavy rain-on-snow events”

The IG agreed unanimously that these indicators are helpful and should be included in training for agencies and operators. They did not agree on whether they would best be located in the regulations or in the BMP implementation field book (“purple book”).

S&TC C10.

Training needs include,

- Identification and mapping for DPOs of “unstable areas,”
 - information available from the scoping maps, digital elevation models, and other sources to identify and map these areas
 - identification of which slopes <67% are unstable, including application of the indicators listed under this definition
- Identification of “saturated soils” and understanding of the indicators for saturation on slopes
- Assessment of likely runout zones for potential slides (e.g., see Chatwin et al., 1994 illustrations)
- Connection between FRPA standards and water quality standards, and sources of information on water uses
- Any changes adopted in regulation or made to the DPO form.

IGC9am. The IG concurs with the S&TC C10 on training needs with the following changes.

Training needs include,

- Identification and mapping for DPOs of “unstable [SLIDE-PRONE] areas, and identification of ”unstable slopes” in BMPs
 - information available from the scoping maps, digital elevation models, and other sources to identify and map these areas
 - identification of slopes <67% that are unstable, including application of the [ALL] indicators developed by the S&TC
 - [WHICH SLOPES <67% ARE UNSTABLE OR SLIDE-PRONE]
- Identification of “saturated soils” and understanding of the indicators for saturation on slopes
- Assessment of likely runout zones for potential slides (e.g., see Chatwin et al., 1994 illustrations)
- Connection between FRPA standards and water quality standards, and sources of information on water uses
- Use of purple book – familiarity with information
- Mapping for DPOs, for example .220(6) re yarding techniques and location of landings
- Any changes adopted in regulation or made to the DPO form.

S&TC Non-consensus item: The S&TC did not reach consensus on the issue of whether or not to retain the clause, “and cause degradation of surface or standing water quality” in .290(d). The committee agreed to forward two options to the board as follows. The Board forwarded the issue to the I.G. See S&TC minutes #3, pp. 8-13 for discussion of this issue.

Option A. Leave the text of .290 (d) as is except for the change below:

“(d) An operator shall use end-hauling and full-bench construction techniques if mass wasting from overloading on an unstable slope or slide-prone area or erosion of sidecast material is likely to occur and cause degradation of surface or standing water quality.

Supporters stated that road construction issues are best addressed on a site-by-site basis, that end-haul/full-bench construction may also have landscape impacts, and that the existing and recommended BMPs provide the tools to address road proposals that have the potential to impact water quality or fish habitat.

Option B. change .290(d):

“(d) An operator shall use end-hauling and/or full-bench construction techniques if

- 1) mass wasting from overloading on an unstable slope or slide-prone area is likely to occur, or
- 2) erosion of sidecast material is likely to occur and cause degradation of surface or standing water quality.”

Supporters stated that extent of impacts from road construction on an unstable slope or slide-prone area is unpredictable, and that road construction in areas where mass wasting is likely to occur should require end-hauling and full-bench construction to minimize landslide potential.

Neutral. Moselle stated that either option is OK; fish habitat is protected under either option. Landwehr and Baichtal were indifferent with a slight preference for Option A. Landwehr stated that there would be little difference between the options in actual practice.

The IG deferred to the Board’s August 31, 2011 unanimous recommendation to retain the existing language without change.

Final Landslide Standards Implementation Group Recommendations		
Topic	Implementation Group recommendation	Draft regulation language
Definitions and Terms	Keep the existing term “high risk of slope failure” in 11 AAC 95.280(d)(1) under slope stability standards.	No change needed
	Use the existing mass wasting definition in the regulations for both “mass wasting” and “landslide”	No change needed
	Use “unstable area” in the regulation section on Detailed Plans of Operation (DPOs) (11 AAC 95.220), and include a new definition of “unstable area” with suggested indicators in the regulations	<p>Revise 11 AAC 95.220 (a)(9)(A) (Detailed Plan of Operations) as follows:</p> <p>“(9) the following slope information for areas that are located in cutting units or traversed by roads:</p> <p>(A) any known unstable [OR SLIDE-PRONE SLOPE] area. <u>For the purposes of identifying unstable areas under this section, consider sites with slopes generally in excess of 50% gradient, where one or more of the following indicators may exist.</u></p> <ul style="list-style-type: none"> • <u>landslide scars,</u> <ul style="list-style-type: none"> ▪ <u>jack-strawed trees,</u> ▪ <u>gullied or dissected slopes,</u> ▪ <u>a high-density of streams or zero-order basins (source basins for headwater streams), or</u> ▪ <u>evidence of soil creep.”</u>

<p>Definitions and Terms, cont.</p>	<p>Use “unstable slope” in all other BMPs that previously used the terms “unstable slope,” “unstable or slide-prone slope,” or “unstable slope or slide-prone area.” These include the BMPs on road construction (11 AAC 95.290), harvest unit planning and design (.340), landings (.345), cable yarding (.360), and tracked and wheeled harvest systems (.365). Add a new definition of “unstable slope” will be added to the regulatory definitions.</p>	<p>Add to 11 AAC 95.900 Definitions:</p> <p><u>“Unstable slope” means a slope exhibiting mass wasting or where mass wasting is likely to occur.”</u></p>
		<p>Amend 11 AAC 95.290 Road construction: “(a) When constructing a forest road on a slope, an operator, where feasible, shall avoid locating a road on a slope greater than 67 percent[,] <u>or</u> on an unstable slope[, OR IN A SLIDE-PRONE AREA]. If avoiding that slope [OR AREA] is not feasible, site-specific measures must be planned...</p>
		<p>See section on unstable fill material for .290(b) below</p>
		<p>No change needed in .290(d)</p>
		<p>11 AAC 95.340 See new subsection below</p>
		<p>Amend 11 AAC 95.345 Landing location, construction, and operation: [...] (b)(4) where slopes have a grade greater than 67 percent <u>or</u> are unstable[, OR ARE IN A SLIDE-PRONE AREA], fill material...</p>
		<p>11 AAC 95.360 See new subsection below</p>
<p>Definitions and Terms, cont.</p>	<p>Use the term “unstable fill material” in the BMP on balancing cuts and</p>	<p>Amend 11 AAC 95.290. Road construction: [...] (b) If constructing a road on a slope greater</p>

	fills in road construction, and add this term to the definitions in the regulations	<p>than 67 percent[,] <u>or</u> on an unstable slope [, OR IN A SLIDE-PRONE AREA] is necessary, an operator [...]</p> <p>(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, <u>unstable</u> fill material may not be used [IF IT IS UNSTABLE, FINE TEXTURED, OR PRONE TO MASS WASTING] and cuts must be minimized where fine textured soils are known or encountered;</p>
		<p>Add to 11 AAC 95.900. Definitions:</p> <p>“Unstable fill material” means organic debris, organic soil, or fine-textured mineral soils. A fine-textured soil has a texture of silty-clay, sandy-clay, or clay.”</p>
BMPs	The Implementation Group deferred to the Board’s decision to retain the qualification that restrictions to blasting and excavation under saturated soil conditions (11 AAC 95.290(b)(3)) be limited to conditions where mass wasting “is likely to occur and cause degradation of surface or standing water quality.”	No change needed
	The Implementation Group deferred to the Board’s decision to retain the qualification that requirements for end-hauling and full-bench construction (11 AAC 95.290(d)) be limited to conditions where mass wasting “is likely to occur and cause degradation of surface or standing water quality.”	No change needed

	<p>Add a new subsection to the cable yarding BMPs (11 AAC 95.360) requiring that operators minimize disturbance to soils, understory vegetation, stumps, and root systems.</p>	<p>Amend 11 AAC 95.360 Cable yarding: [...] (c) The following standards apply to cable yarding operations: [...] (6) on unstable slopes, an operator shall minimize disturbance to soils, understory vegetation, stumps, and root systems.</p>
<p>BMPs, cont.</p>	<p>Add a new subsection to the harvest planning BMPs (11 AAC 95.340) requiring that operators consider techniques such as partial cuts, retention areas, and helicopter or skyline yarding to minimize disturbance.</p>	<p>Add to 11 AAC 95.340, Harvest unit planning and design: (d) To minimize disturbance to soils, understory vegetation, stumps, and root systems on unstable slopes, an operator should consider techniques such as partial cuts, retention areas, and use of helicopter or skyline systems to achieve full suspension of logs.</p>
	<p>Add to the tracked and wheeled harvesting BMPs (11 ACC 95.365) a requirement that an operator provide notice to DOF before operating tracked or wheeled equipment on unstable slopes.</p>	<p>Amend 11 AAC 95.365. Tracked and wheeled harvest systems: (a) A person may not skid timber or operate construction equipment or machinery in a water body catalogued as anadromous under AS 16.05.871, without written approval of the Department of Fish and Game, or in any other surface waters, marshes, [OR]non-forested muskegs, or on unstable slopes without prior notice to the division except, that equipment may be operated on frozen surface waters, marshes, or non-forested muskegs without prior notice to the division.</p>
<p>Indicators</p>	<p>The Group agreed unanimously that the Science & Technical Committee’s indicators for identifying “unstable slopes” are helpful and should be included in training for agencies and operators. They did not agree on whether they would best be located in the regulations or in the BMP implementation field book (“purple book”).</p>	<p>Defer to BOF the decision on whether to include the following indicators in the regulatory definition for “unstable slope” or add them to the BMP implementation field book:</p> <p>“For the purposes of identifying unstable slopes, consider sites with slopes generally in excess of 50% gradient, where one or more of the following indicators may exist.</p> <ul style="list-style-type: none"> • landslide scars, • jack-strawed trees, • gullied or dissected slopes, • a high-density of streams or zero-order basins (source basins for headwater streams), or • evidence of soil creep.”

<p>Indicators, cont.</p>	<p>The Group agreed unanimously that the Science & Technical Committee’s indicators for identifying “saturated soils” are helpful and should be included in training for agencies and operators. They did not agree on whether they would best be located in the regulations or in the BMP implementation field book (“purple book”).</p>	<p>Defer to BOF the decision on whether to include the following indicators in the regulatory definition for “saturated soils” or add them to the BMP implementation field book:</p> <p>“Evidence of saturated soil conditions on a steep slope or unstable area may include:</p> <ul style="list-style-type: none"> • On cutslopes, noticeable soil liquefaction or movement of large soil particles to the ditchline • Significant water flow evident on the surface, exposed bedrock, or impermeable hardpan • Excavated or disturbed material performing in a liquid manner • High rainfall rates in previous 24 hours, e.g., 6 inches in a 24-hour period, or prolonged periods of heavy rainfall • Heavy rain following extended periods of freezing • Heavy rain-on-snow events”
<p>Training</p>	<p>Provide training on</p> <ul style="list-style-type: none"> • DPO mapping and identification of “unstable areas;” • use of the indicators to identify unstable slopes, unstable areas, and saturated soils; • assessment of slide runout zones, • the connection between FRPA standards and DEC water quality standards, • use of the BMP implementation field book (“purple book”), • and changes to the BMPs. 	<p>No change to regulations needed</p>

IMPLEMENTATION GROUP RECOMMENDATIONS ON CHANGES TO FRPA BEST MANAGEMENT PRACTICES (BMPs) AND DEFINITIONS
September 27, 2011

This document shows possible language for incorporating S&TC recommendations into the FRPA regulations. Changes are in red. Additions are in text that is underlined; deletions are [BRACKETED AND CAPITALIZED].

11 AAC 95.220. Detailed plan of operations. (a) Before beginning an operation on forest land, the operator shall file a detailed plan of operations with the state forester at the area office of the division with jurisdiction over the geographic area in which the operations will occur. A detailed plan of operations must be submitted on a form provided by the division and must include the following information: [...]

(9) the following slope information for areas that are located in cutting units or are traversed by roads:

- (A) any known unstable [OR SLIDE-PRONE SLOPE;] area. For the purposes of identifying unstable areas under this section, consider sites with slopes generally in excess of 50% gradient, where one or more of the following indicators may exist.
 - (i) landslide scars,
 - (ii) jack-strawed trees,
 - (iii) gullied or dissected slopes,
 - (iv) a high density of streams or zero-order basins (source basins for headwater streams),
 - or
 - (v) evidence of soil creep.

(B) slope gradient greater than 67 percent; and

(C) where known, the site-specific erosion prevention measures developed under 11 AAC 95.290(a);

11 AAC 95.290 Road construction. (a) When constructing a forest road on a slope, an operator, where feasible, shall avoid locating a road on a slope greater than 67 percent[,] or on an unstable slope[,] OR IN A SLIDE-PRONE AREA. If avoiding that slope [OR AREA] is not feasible, site-specific measures must be planned to address slope instability due to road construction. The measures must be approved by the division and must meet the requirements of (b) of this section.

(b) If constructing a road on a slope greater than 67 percent[,] or on an unstable slope[,] OR IN A SLIDE-PRONE AREA is necessary, an operator

(1) may not bury any of the following material except as puncheon across swampy ground or for culvert protection:

(A) a log chunk of more than five cubic feet in volume or a loose stump, in the load-bearing portion of a road;

(B) any significant amount of organic debris within the load-bearing portion of a road;

(C) excessive accumulation of debris or slash in the road-bearing portion of a road fill;

(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, unstable fill material may not be used [IF IT IS UNSTABLE, FINE-TEXTURED, OR PRONE TO MASS WASTING,] and cuts must be minimized where fine textured soils are known or encountered; and

(3) may not conduct excavation and blasting activities during saturated soil conditions if mass wasting is likely to result and cause degradation of surface or standing water quality.

[...]

11 AAC 95.340. Harvest unit planning and design. (a) A logging system must be appropriate for the terrain, soils, and timber type so that yarding or skidding can be accomplished in compliance with AS 41.17 and this chapter.

(b) A harvest unit must be designed so that felling, bucking, yarding, skidding, and reforestation can be accomplished in compliance with AS 41.17 and this chapter.

(c) On state and municipal forest land, an operator conducting timber harvest, road construction, or a related activity shall, where feasible, retain a buffer of not less than 330 feet in radius around each bald eagle nesting tree.

(d) To minimize disturbance to soils, understory vegetation, stumps, and root systems on unstable slopes, an operator should consider techniques such as partial cuts, retention areas, and use of helicopter or skyline systems to achieve full suspension of logs.

11 AAC 95.345. Landing location, construction, and operation. [...]

(b) An operator shall locate and construct a landing according to the following standards:

(1) when choosing the site of a landing, an operator shall consider the effects of the landing location and provide for a logging layout that will reduce the overall adverse effects of the operation;

(2) the design of a landing must minimize the need for sidecasting or fill;

(3) a landing must be no larger than necessary for safe operation of the equipment and decking of logs;

(4) where slopes have a grade greater than 67 percent, or are unstable~~[OR IN A SLIDE-PRONE AREA,]~~ fill material used in construction of a landing must be free from loose stumps and excessive accumulations of slash, and must be mechanically compacted in layers if necessary to prevent soil erosion and mass wasting;

(5) a truck road, a skid trail, or a fire trail must be outsloped or cross drained uphill of the landing and the water diverted onto the forest floor away from the toe of any landing fill;

(6) a landing must be sloped, water barred, ditched or otherwise constructed and maintained to minimize accumulation of water on the landing; and

(7) any excavated material from the construction of a landing may not be placed where it is likely to result in degradation of surface water quality. [...]

11 AAC 95.360. Cable yarding. [...] (c) The following standards apply to cable yarding operations:

(1) when feasible, an operator shall use maximum available deflection;

(2) where feasible, an operator shall use uphill yarding techniques;

(3) where downhill yarding is used, an operator shall use deflection to lift the leading end of the log and minimize downhill movement of slash and soils;

(4) when yarding parallel to surface waters, and when in or near a riparian area, an operator shall make an effort to minimize soil disturbance and to prevent logs from rolling into surface waters or the riparian area; **[AND]**

(5) when yarding across marshes and non-forested muskegs, an operator shall make an effort to minimize damage to vegetative cover~~[.]; and~~

(6) on unstable slopes, an operator shall minimize disturbance to soils, understory vegetation, stumps, and root systems.

11 AAC 95.365. Tracked and wheeled harvest systems. (a) A person may not skid timber or operate construction equipment or machinery in a water body catalogued as anadromous under AS 16.05.871, without written approval of the Department of Fish and Game, or in any other surface waters, marshes, [OR] non-forested muskegs, or on unstable slopes, without prior notice to the division except, that equipment may be operated on frozen surface waters, marshes, or non-forested muskegs without prior notice to the division. [...]

11 AAC 95.950. Definitions. [...]

(XX) “unstable fill material” means organic debris, organic soil, or fine-textured mineral soils. A fine-textured soil has a texture of silty-clay, sandy-clay, or clay;

(XX) “unstable slope” means a slope exhibiting mass wasting or where mass wasting is likely to occur;

MINUTES OF IMPLEMENTATION GROUP MEETINGS

FRPA Landslide Issues Implementation Group August 9, 2011 - Ketchikan, Alaska DRAFT MINUTES - MEETING #1

Attendance. Bert Burkhart, Mary Edenshaw, Marty Freeman, Bob Girt, Kevin Hanley, Mark Kaelke, Kyle Moselle, Pat Palkovic, Paul Slenkamp, Greg Staunton, Mark Vinsel, and Ron Wolfe were present in Ketchikan. Karl Hagerman was present by phone from Petersburg. Bill Rotecki was absent for family medical reasons.

Introductions. All working group members introduced themselves. Brian Kleinhenz from Sealaska was also present and may serve as an alternate for Ron Wolfe at some meetings.

Review of landslide standard review process to date (*see White Paper in handouts*). Freeman presented an overview of the process to review the Forest Resource and Practices Act (FRPA) standards to prevent or minimize adverse impacts of landslides. In October 2007, the Mitkof Highway Homeowners Association originally raised concerns about public safety hazards from proposed timber harvesting on Mental Health Trust land upslope from residential areas along the Highway. The Association asked the Board to request changes to FRPA to provide authority to address public safety issues. The Board of Forestry asked the Division of Forestry (DOF) to convene a Science & Technical Committee (S&TC) to assess the geographical scope of public safety hazards associated with landslides and forest operations.

The S&TC assessed coastal forest lands from Dixon Entrance to Cordova and developed scoping maps of potential slide hazards above public roads and residential areas.

The BOF reviewed the scoping information, and after lengthy discussion decided not to request public safety authority under FRPA. They felt that the public safety risks were better addressed through local government ordinances. However, they did ask the S&TC to review the existing FRPA standards to determine whether any changes or additions were needed to adequately protect fish habitat and water quality from landslide impacts associated with forest operations.

The S&TC reviewed the landslide standards in the Forest Resources and Practices Act and the BMPS in its regulations. They developed a dozen recommendations for definitions, BMPs, and training programs.

The Board reviewed the S&TC recommendations and asked DOF to convene an Implementation Group of affected stakeholders. They charged the group with determining how to implement the recommendations in a practical and effective manner on the ground, and to address the one point on which the S&TC did not reach consensus. Results from the group will go to the BOF. If regulatory changes are endorsed, they will go through the standard process to establish regulations, and agencies will be directed to implement other administrative actions.

Freeman noted that in previous FRPA processes, consensus recommendations from the Implementation Groups were endorsed by Board and recommendations for statutory and amendments and changes to regulations/were adopted.

Implementation Group charge, organization, and principles (*see handout*). Freeman explained that the Group is charged with determining how to apply the S&TC consensus recommendations in a practical and effective manner on the ground, and to recommend a resolution for the one non-consensus item from

the S&TC. The Group can also recommend implementation methods such as regulation changes, training, field guides, etc. Four principles that guided revision of FRPA in 1990, also guide this effort: Fairness, No Big Hit, Enforceability, and Professional Management.

The S&TC process focused on science and technical information. The I.G. review includes economic concerns. Freeman noted that FRPA applies to public and private land. On private land FRPA prohibits impairment of the productivity of land and water for renewable resources. Public safety is outside FRPA authority.

Implementation Group meetings are informal work sessions rather than formal meetings. All meetings are open to the public. Prior to the first meeting, Freeman sent a letter describing the Implementation Group process and membership to a mailing list of interested parties, including individuals, organizations, Native corporations, municipalities, and businesses. Freeman will send a copy of Group meeting minutes to the mailing list, and distribute any public comments to the committee. There will be opportunities for public comment at each meeting.

Group members may designate an alternate with similar expertise to participate on the committee when they cannot be present. Members should brief their alternates prior to meetings they cannot attend.

Wolfe noted that there has sometimes been iterations between the science and technical committees and a policy group during these processes. Freeman noted that the landslide issues are narrower than the anadromous waters issues addressed by previous groups.

Hagerman commented that he is aware of the public safety concerns on Mitkof Island and asked whether the S&TC recommended that Petersburg adopt an ordinance on this issue. Freeman clarified that it was the Board of Forestry that recommended that public safety be addressed through other means, including ordinances or other local government actions under Title 29. Moselle noted that the Board reviewed a lengthy list of options for addressing public safety. Slenkamp added that the S&TC did a major risk mapping effort, and that the Petersburg area was the only area with significant public safety risks where the areas at risk hadn't already been harvested. He added that some boroughs (e.g., Ketchikan and MatSu) have addressed forestry issues like this through ordinances.

Review of existing standards. (*see FRPA fieldbooks and White Paper*) Freeman reviewed the current landslide standards in the FRPA and its regulations. They are summarized in the White Paper handout and listed in full in the Act (yellow fieldbook) and regulations (green fieldbook)

Freeman noted some "gaps" in the existing standards at the start of the process. The standards do not define "landslide," "unstable slope," "unstable or slide-prone slope," "unstable slope or slide-prone area," "high risk of slope failure," or "fill material prone to mass wasting." The regulations do not have best management practices (BMPs) for specific harvesting and yarding methods in unstable or slide-prone areas, partial harvesting, or helicopter operations.

In response to a question on downhill yarding, Burkhart clarified that cable logging systems use a complete loop of cable so that they can control the speed and movement of logs in yarding operations.

Slenkamp commented that the Board of Forestry spent several years discussing FRPA and its regulations regarding logging and unstable slopes. While the forest practices standards don't directly address public safety, they do address issues that could cause mass wasting in areas with water quality issues, and that will also help prevent or minimize slides in areas with safety concerns.

Vinsel noted that the Board did discuss the idea that slides would likely have water quality impacts in areas with public use.

Hagerman agreed that water quality issues may accompany public safety issues – the Mitkof homeowners do rely on streams in their area for their drinking water. The work on the FRPA standards will help them, but they don't feel that way entirely. Freeman noted that she invited the Mitkof Highway Homeowners Association to participate in the Implementation Group because of the water quality issues, but they declined to do so.

Wolfe noted that the FRPA gives the Division of Forestry the authority to issue a stop work order if a violation of the Act or regulations is likely to occur and harm public resources. They can use this tool if an operator hasn't complied with 11 AAC 95.340 and designed a logging system that will comply with the Act. Hanley observed that in practice stop work order's are usually only applied after the fact – when a violation is found in the field. Palkovic noted that the Division of Forestry has other tools to ensure FRPA compliance before the need to issue a formal stop work order.

Moselle said that the S&TC mentioned that it might be good to look at the Detailed Plan of Operations (DPO) and Forest Land Use Plan requirements to make sure enough information is gathered to identify slide issues ahead of time. The agencies like to be proactive.

In response to a question, Freeman clarified that the DPO review process is an interagency process, not a public review process. Any entity can request to receive a copy of the basic DPO information for a particular area. Palkovic added that DOF used to be required to send a copy of DPOs to affected coastal districts, but that is no longer the case since the Alaska Coastal Management Program was not extended by the legislature. She noted that the agencies and coastal districts were only to include comments to operators and landowners based on FRPA authorities. However, municipalities can talk directly with operators and owners if they have other concerns.

Freeman clarified that DPO requirements apply to state operations not managed by the Dept. of Natural Resource, trust lands, municipal lands, and private land. On state land managed by DNR, the Division of Forestry must prepare a Forest Land Use Plan, which is subject to public and interagency review. Some municipalities have similar requirements of their own.

Slenkamp reported that the Mental Health Trust has voluntarily not harvested its land on Mitkof Island that caused the original public safety concerns. The Trust is working hard on a land exchange with the US Forest Service that would resolve this issue near Petersburg. A Detailed Plan of Operations was submitted to harvest the parcel, but the Trust has not acted on the harvest plans. Hagerman said that the Trust's forbearance is appreciated.

Review of STC products and recommendations

Freeman summarized the information in the products from the S&TC. The bibliography (*see bibliography handout*) includes references relevant to landslide issues associated with forest operations in coastal Alaska. Freeman encouraged Group members to read the abstracts for the 10 starred papers in the bibliography. The S&TC identified these papers as key references.

The S&TC also developed GIS scoping maps (*see scoping maps handout*) to assess the geographic extent of landslide hazards that could present risks to public safety. Public roads and evidence of buildings were used to identify areas with significant public use. The total area reviewed covered 29.4 million acres, of which an estimated 51,700 acres were in potential hazard areas along public roads, including 7,600 acres that had some type of buildings. The scoping maps also show land ownership, steep slopes, municipal boundaries, and past harvesting in scoping areas identified with buildings. Almost three-quarters of the hazard land along the road is managed by the USFS or the state. However, three-quarters of the area near buildings was in private, trust, or municipal ownership near communities.

Most of the hazard area previously had harvesting in at least a portion of the upslope forest, and Slenkamp noted that many of the areas were harvested prior to the current version of FRPA. Palkovic added that while much of the general hazard area has been logged, some patches within these areas weren't cut, usually because of low values or the difficulty of operations on the steepest slopes.

Prior harvests in hazard areas include past operations near Ketchikan, Klawock, and Wrangell. He said that Columbia Helicopters has done a good job minimizing impacts of harvest operations, for example along the Tongass Narrows. The helicopter operations reduced roading and allowed for partial cuts. Previously, areas were logged primarily by conventional logging [e.g., cable or ground-based systems]. Foresters can use helicopter yarding or full-suspension cable systems on problematic areas.

Vinsel asked whether steep slopes increase operating costs for helicopter systems. Burkhart explained that slope doesn't matter as much with helicopter operations. Helicopters are the most expensive yarding system. They are used where road building is too expensive, especially for partial cuts. There are terrain limits for helicopters where you can't get people in safely.

Slenkamp emphasized that there should be a site-specific look at harvest operations when designing operation – you need to see the area on the ground.

Freeman reported the S&TC also developed eleven BMP and training recommendations (*see Consensus Point handout*). They include proposed definitions, criteria for identifying unstable areas and saturated soils, additions or changes to several BMPs, and training needs.

Vinsel said he wants to be sure that new information on economics is raised in the discussion of the S&TC recommendations. Burkhart stated that there will be places where the landslide standard proposals will raise economic issues for field operations.

Kaelke asked how it is determined that an event is “likely” to occur? Freeman replied that the S&TC tried to incorporate factors affecting likelihood into the definitions (e.g., C9am). It will still require best professional judgment. Some states require reports by geotechnical experts in slide-prone areas, but that doesn't always provide a solution. In the case of the Mitkof Island concerns, the opposing sides each hired experts, and they disagreed. Moselle added that the likelihood of a problem occurring relates in part to the knowledge and skill of the operator on the ground, and the types of equipment available for use.

Kaelke asked whether slides occur because potential problems are unknown or ignored. Palkovic said that soil wants to go downhill with gravity. There are some areas with evidence of problems. Operators may bring up concerns. Different people notice different things in the field. Operators often want to avoid problems – washouts cost them more. Some will try to take shortcuts.

Wolfe commented that even among geotechnical experts, dueling experts can occur. Licensing of geotechnical experts is beyond FRPA authority. Geologists in Alaska are largely associated with the oil industry – the Alaska licensing system is not helpful to forest industry needs. Wolfe would like to avoid the licensing issues.

Vinsel noted that California requires reports from experts. He asked about Doug Swanston's research. Freeman said that Swanston was the leading researcher on landslides in coastal forests in Alaska. He is now retired. The DNR Division of Geological and Geophysical surveys does some work on geologic hazards, especially earthquake hazards, but they don't have a cadre of people for forestry work.

Vinsel asked whether the goal is to prevent all slides, or those that have consequences for fish habitat, water quality, economics, or safety? We can't stop all slides – many happen naturally. The concern is for

those with adverse impacts. Slenkamp added that slopes in Alaska are waiting to slide. Slides associated with timber harvest usually carry less debris. Freeman noted that Swanston’s work showed that the number of slides increased with timber harvesting, but slides associated with harvesting were shorter on average, and a lower percentage entered fish streams.

Girt noted that the phrase “is likely to occur” exists in 11 AAC 95.290(d), the S&TC item for which there was no consensus. He wants to be sure we keep it to that specific context. “Likely” is a probability term.

Staunton addressed the question of who makes the call on FRPA issues such as when something is “likely to occur.” A DPO starts a conversation among the agencies and with the operator and landowner to determine whether the operator will be able to meet the intent of the Act. The local DOF Area Forester makes the decision with input from DEC and ADF&G. The Area Forester is familiar with the ground and the people involved and must be comfortable that the proposed activities will comply with the Act. There is dialogues among the parties, field inspections, and if necessary directives to the owner or operator. The operator or other parties can influence the decision by providing additional information [e.g., on ground conditions, equipment available, etc.], and operators can appeal a decision with which they disagree. FRPA decisions are made administratively rather than judicially. Freeman added that if DEC or ADF&G disagree with the DOF decision, they can elevate the decision to the directors/state forester, and then the commissioners.

Burkhart noted that the people doing the initial layout of timber operations are usually foresters and engineers.

Kaelke summarized, saying that the onus for identifying the likelihood of landslides is initially on the operator through the DPO. Freeman concurred, and said that the DPO is then reviewed by the three agencies. Moselle added that the operators also have to show fish streams in the DPO, and ADF&G reviews that information. If a problem occurs in a fish stream, ADF&G also has authorities to deal directly with the operators in addition to the authorities that DNR has under FRPA.

Wolfe commented that Sealaska has digital mapping with 5-meter contours on its land – it has the money to get that level of information in advance. Hanley said that type of information has improved the DPOs. Palkovic stressed that site visits are still important – there’s so much variation on the ground. Wolfe agreed that a ground view is still necessary. Staunton said that if you have the money to look at what’s proposed, that’s the best way to deal with it.

Slenkamp said that the closer an operation is to a populated area, the more scrutiny it will get. He added that landowners face liability if problems do occur.

Discussion of S&TC recommendations.

◆ Discussion of S&TC C1:

“C1. For the purposes of the FRPA and its regulations, define both “landslide” and “mass wasting” using the definition under 11 AAC 95.900 (44):

"mass wasting" means the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity.”

Wolfe asked whether the S&TC consensus point means that “landslide” and “mass wasting” mean the same thing. Freeman and Moselle said yes, for the purposes of FRPA.

IGC1: The Implementation Group concurs with the S&TC C1 without change:

C1. For the purposes of the FRPA and its regulations, define both “landslide” and “mass wasting”

using the definition under 11 AAC 95.900 (44):

"mass wasting" means the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity.

◆ Discussion of S&TC C2 and C3am:

"C2. Change the terms "unstable slope" and "unstable or slide-prone slope" to "unstable slope or slide-prone area" wherever they appear in the regulations."

"C3am. "Unstable slope or slide-prone area" means a slope or area, generally in excess of 50% gradient, where one or more of the following indicators may exist. Slide risk depends on the combination of factors at a given site.

- landslide scar initiation zones,
- jack-strawed trees,
- gullied or dissected slopes,
- a high-density of streams or zero-order basins (source basins for headwater streams), or
- evidence of soil creep.

The S&TC recognizes that slope dissection is a significant indicator of slide risk, but difficult to assess – closely spaced dissections are a red flag, as are few dissections that funnel to a common collecting area. The S&TC recommends that the procedures in Chatwin, et al., 1994 be referenced in assessing landslide risk. One rule of thumb for assessing frequency of dissection would be where dissections are so closely spaced that they preclude split-yarding. This distance is approximately equal to tree height."

Burkhart asked whether the S&TC used tree height as a guideline for highly-dissected slopes in C3am. Hanley and Freeman replied that the S&TC suggested it as one estimate, but it is just provided as background, not a requirement.

Hanley noted that the USFS also uses slope dissection in its analyses of slope stability.

Girt asked why the proposed definition includes "area." Staunton said that the S&TC wanted to look at broader areas as well as the immediate site. Hanley added that the definition also includes areas between 50% and 67% gradient that aren't included in the references to steep slopes.

Wolfe said that he understands the interest in having consistent terms, but isn't ready to substitute the proposed term everywhere. For example, it shouldn't automatically replace "slopes greater than 67%." Freeman replied that "unstable slope or slide-prone area" and its definition apply to the terms other than "greater than 67%."

Wolfe said that many of the terms in the C3am definition are ambiguous and he questions having them in regulation. He thinks they would fit better in the BMP Implementation fieldbook [the "purple book"].

Moselle noted that the DPO regulations in 11 AAC 95.220(a)(9)(A) already refer to "areas." He doesn't see any change in intent from using the term "unstable slope or slide-prone area." Wolfe said that the change would require additional information in a DPO. "Area" is a broader and more general term. If information is missed, would the DPO be inadequate? Some of the definition terms are not well-defined. Moselle said that concern is valid, and asked whether a consistent term would work if the definition were fixed to be perfect? Wolfe said he wasn't sure. He would like a chance to search for all the "unstable slope..." terms in the regulations before making a decision.

Hanley stated that "slide-prone area" covers areas with a known history of slides, whereas an "unstable slope" may not have slid yet. Girt stated that "slide-prone areas" and "unstable slopes" are one and the

same – if they are unstable, they’ve slid at some point in the past. Southeast Alaska is an unstable landscape. He is concerned that the definition and term will expand the areas where end-haul and full-bench road construction are required.

Palkovic reiterated that the “unstable and slide-prone” term is outside the “slope greater than 67%.” Moselle noted that slope gradient is measurable. There is a need to better define the other three terms. The S&TC felt that the three terms were similar and undefined. The lack of definitions gives unpredictability – how can we improve that. Wolfe said he looks at the definitions from the perspective of whether something can come back to haunt you.

Girt said that we need to be clear that the term applies to the affected site, not just a general area.

Palkovic said that we already need to use a combination of slope gradient and some of the factors in the proposed definition. The proposed language actually makes it more definite.

Wolfe said that operators would have to show the areas in the definition on the DPO, and “slopes” are more discrete than “areas.” That may not be a great consequence. It may be a bigger deal in 11 AAC 290(d) [road construction].

Freeman reiterated that the S&TC intended to provide guidance for identifying areas with slide risks that were outside the “>67% slope” category.

Slenkamp said that you need to be on the ground to assess risk. Wolfe emphasized that one of the original 1990 FRPA principles is that the Act must be implemented in the field. Hanley added that the information in the DPO is important to help determine when the agencies need to be on the ground.

Moselle said that he is uncomfortable having important terms undefined in the regulations. There isn’t a measurable threshold for “unstable/slide-prone.” If a consistent term isn’t used, there will then be multiple undefined terms.

Girt asked whether an area is 20 acres or 200 acres? He reacted to the term “watershed” being used to describe an “area” in the discussion.

Vinsel suggested using one of the other terms [“unstable slope” or “unstable or slide-prone slope”] as the consistent term. Staunton said that Dennis Landwehr, the soil scientist on the S&TC, described “areas” as having multiple problems; they can have both stable and unstable areas within them. Staunton could conceive of folding the concept into “slope.” Moselle commented that “slopes” can also be small or large areas. Palkovic noted that the regulations already use “unstable slope or slide-prone area” multiple times. Moselle stated that there isn’t a sufficient difference between the terms.

Slenkamp quoted the dictionary as using “slope” for an incline, whereas “area” has broader and more varied definitions.

With reference to 11 AAC 95.290(b), Palkovic said that “areas” would be broader, “slope” is more a pinpoint feature. However, there is little difference in the field. A cluster of slide-prone slopes would be a slide-prone area.

Hanley said that information in DPOs varies in the sufficiency and quantity of data. In Sealaska DPOs, you can find the steep slopes right off the bat. That’s not true of DPOs from all sources.

Kaelke suggested referring to road “segments” rather than whole roads might reduce the concern over unintended impacts of the definitions. Freeman cautioned that the existing regulations are designed to

apply to the part of the road in the area of concern, not to the whole road. Switching to “segments” might suggest that the whole extent of a road is intended if not otherwise specified.

Hanley pointed out that 11 AAC 95.290(b) already uses “slide-prone area” and it’s unacceptable to leave it undefined.

Burkhart said that he has worked on a lot of federal timber sales that have EIS’s. When they use “area,” they encompass big sites, like 700 acres. With slides they use “slope stability.” Hanley noted that federal sales may also say, “such and such areas of Unit X exceed 72%...”.

Staunton noted that the regulations are law. “Slope” is ambiguous, too, and is still a significant piece of real estate.

Wolfe closed the discussion by saying that he wants to study the impact of the terms and definitions more closely. Freeman said she would provide a document showing all the places where each of the “unstable slope” terms are used. She asked that all the I.G. members review that list and before the August 23 web conference, consider

- whether a consistent term is needed, and if so, which term,
- whether definition(s) are needed,
- whether definition(s) and indicators (e.g., “jack-strawed trees”) should be located in the regulations, the implementation field book (“purple book”), or some other place.

◆ Discussion of S&TC C4:

“C4. Leave the term “high risk of slope failure” in 11 AAC 95.280 (d)(1) unchanged.”

The Implementation Group concurred that no change or definition was needed for this term.

IGC2: The Implementation Group supports S&TC C4 without change:

S&TC C4. Leave the term “high risk of slope failure” in 11 AAC 95.280 (d)(1) unchanged.

◆ Discussion of C5am:

“C5am. Add the following term to the definitions in 11 AAC 95.950: “**Unstable fill material**” means organic debris, organic soil, or fine-textured mineral soils. A fine-textured soil has a texture of silty-clay, sandy-clay, or clay.

Change ,290(b)(2) as follows:

11 AAC 95.290. Road construction. [...]

(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, unstable fill material may not be used [IF IT IS UNSTABLE, FINE TEXTURED, OR PRONE TO MASS WASTING] and cuts must be minimized where fine textured soils are known or encountered; “

Slenkamp commented that the proposed language defines the term better. Moselle said that the terms in the definition are measurable and consistent with the soil texture classes used in soil science. That helps in the field. It is also good to get rid of “prone to mass wasting,” which is another phrasing for “unstable slope or slide-prone area.”

Palkovic said that she wanted to think about whether the proposed change sets up an internal conflict with .290(b)(1) and (2) regarding the use of organic material in road beds.

Pending the results of Palkovic's review, the Implementation Group concurred with the recommendation from the S&TC without change.

IGC3: The Implementation Group supports S&TC C5am without change:

S&TC C5am. Add the following term to the definitions in 11 AAC 95.950: **“Unstable fill material”** means organic debris, organic soil, or fine-textured mineral soils. A fine-textured soil has a texture of silty-clay, sandy-clay, or clay.

Change .290(b)(2) as follows:

11 AAC 95.290. Road construction. [...]

(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, unstable fill material may not be used [IF IT IS UNSTABLE, FINE TEXTURED, OR PRONE TO MASS WASTING] and cuts must be minimized where fine textured soils are known or encountered;

◆ Discussion of S&TC C6:

C6. Add to **11 AAC 95.360 Cable yarding: [...]** (c) The following standards apply to cable yarding operations: [...]

(6) on unstable slopes or slide-prone areas, an operator shall minimize disturbance to soils, understory vegetation, stumps, and root systems. Add to this section or to .340: In these areas, an operator should consider partial cuts, helicopter yarding, retention areas, or other techniques designed to meet these objectives.

Wolfe suggested that the I.G. consider adding “where feasible” to this BMP. Freeman noted that the proposed language already uses the standard “minimize”. After some discussion, and a review of the definition in the regulations for “feasible”, Palkovic and Vinsel noted that the definition for minimize in the regulations incorporates the term “feasible,” and feasible includes economic considerations.

"minimize" means to limit to the extent feasible, and does not include the requirement of improving naturally existing conditions;

"feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, technical, and safety factors;”

In light of these definitions, the Implementation Group concurred with the following language as proposed by the S&TC.

IGC4: Pending review of the term “unstable slope or slide-prone area,” the Implementation Group supports the first portion of the S&TC C6 recommendation that adds the following language to 11 AAC 95.360:

“(c) The following standards apply to cable yarding operations: [...]

(6) on unstable slopes or slide-prone areas, an operator shall minimize disturbance to soils, understory vegetation, stumps, and root systems.”

Moselle commented that “feasible” doesn’t give license to operators to do just anything. You know what disturbance looks like on the ground. Slenkamp said that it is good to have a club to ensure compliance.

Regarding the remaining part of S&TC C6, the I.G. recommended putting the language in 11 AAC 95.340 [harvest unit planning and design] rather than in .360 [cable yarding].

Slenkamp said that if you have unstable slopes, you should be looking at different methods of harvest. Girt said that there are two issues – full-suspension yarding and partial cutting. Wolfe said that the goal for yarding is full suspension, not whether full suspension is achieved by helicopter yarding or cable yarding. Slenkamp commented that there are many variables involved in deciding whether to use helicopter or cable systems. Wolfe said that it is OK to include helicopter yarding, as long as it is clear that it is just one of the possible techniques that may be appropriate.

Palkovic asked whether “selective cut” is better than “partial cut.” Wolfe and Slenkamp said that the terms are interchangeable. Freeman noted that “partial cut” is the term that is defined in the regulations.

Palkovic noted that partial cuts aren’t always better depending on site conditions. Wolfe said that the applicability of partial cutting to decreasing ground disturbance depends on how the cut is designed. Burkhart reiterated that you need to do the ground work to determine the appropriate techniques to use. Hanley said that it is OK to include “partial cuts” in the list of possible techniques as long as the term “should consider” is used.

Pending discussion on August 23 of the term “unstable slope or slide-prone area,” the group agreed to add the following language to 11 AAC 95.340: “On unstable slopes or slide-prone areas, an operator should consider techniques designed to minimize disturbance to soils, understory vegetation, stumps, and root systems such as partial cuts, retention areas, or use of helicopter or skyline systems to achieve full suspension of logs.”

DRAFT IGC5: Pending review of the term “unstable slope or slide-prone area,” the Implementation Group supports adding language to implement the second portion of S&TC C6 to 11 AAC 95.340 as follows:

“On unstable slopes or slide-prone areas, an operator should consider techniques to minimize disturbance to soils, understory vegetation, stumps, and root systems. Examples of possible techniques include partial cuts, retention area, and use of helicopter or skyline systems to achieve full suspension of logs.”

Note: As I typed this, I thought that splitting this into two sentences and adding the highlighted phrase might make it clearer. We can review this at the Aug. 23 meeting.

◆ Discussion of S&TC C7:

“C7. Add to **11 AAC 95.365. Tracked and wheeled harvest systems:** (a) A person may not skid timber or operate construction equipment or machinery in a water body catalogued as anadromous under AS 16.05.871, without written approval of the Department of Fish and Game, or in any other surface waters, marshes, [OR]non-forested muskegs, or unstable slopes or slide-prone areas without prior notice to the division except, that equipment may be operated on frozen surface waters, marshes, or non-forested muskegs without prior notice to the division.”

Moselle noted that we will have to review this after the I.G. completes its discussion of the term “unstable slope or slide-prone area.”

Slenkamp commented that although ground-based operations usually avoid steep slopes, some operators only have shovels and may push slope limits.

Girt said that this situation is already covered by the BMPS on harvest unit planning and design in 11 AAC 95.340. Moselle said that the proposal differs from the existing BMPs in that it includes construction machinery. Some operators are using shovels on steeper ground than in the past and the technology is changing. Ground-based systems may be more applicable on steep slopes in the future.

Wolfe stated that the DPO should already include this information, and asked whether this would require a different notice. Hanley said that the DPO doesn't specify where different yarding techniques are used within a given unit. Freeman said that this notice should come through the DPO, not a separate form. Wolfe said something different should be done to the DPO form if this isn't covered. Palkovic reported that operators vary in how much detail they show on the DPO. Slenkamp elaborated that the issues largely occur with small operators. Palkovic observed that larger operators sometimes don't provide this information either. She added that the other information required by 11 AAC 95.365 also comes through the DPO form. Wolfe clarified that this recommendation would provide the foundation for requiring this information in the DPO.

Staunton said that this would apply where operators use ground-based equipment on slopes >50%. In those situations, DOF would want to discuss the proposed activities with the operator first. Palkovic supported keeping the proposed language in 11 AAC 95.365. Moselle said that the proposed language would be redundant in 11 AAC 95.220 [Detailed Plans of Operation] but complementary in .365 [tracked and wheeled harvest systems].

Hanley added that he has not seen DPOs show stream crossings in shovel yarding units. Palkovic agreed and said crossings are usually discussed with operators in the field.

DRAFT IGC6: Pending review of the term “unstable slope or slide-prone area”, the Implementation Group supports S&TC C7 without change:

C7. Add to 11 AAC 95.365. Tracked and wheeled harvest systems: (a) A person may not skid timber or operate construction equipment or machinery in a water body catalogued as anadromous under AS 16.05.871, without written approval of the Department of Fish and Game, or in any other surface waters, marshes, [OR]non-forested muskegs, or unstable slopes or slide-prone areas without prior notice to the division except, that equipment may be operated on frozen surface waters, marshes, or non-forested muskegs without prior notice to the division.

◆ Discussion of C8/C9am: In response to a question, Freeman clarified that the proposed definition of saturated soils in C9am applies specifically to 11 AAC 95.290.

Next meeting. The next meeting will be a web conference on August 23. We will have sites in Ketchikan and Juneau. Members from Klawock and Petersburg can connect in directly or join one of the other sites.

Agenda

- C2 and C3am: review how the various terms related to unstable slopes and slide-prone areas are used, decide whether a consistent term is needed, recommend definition(s) as needed, and recommend where the definitions should reside (e.g., in the regulations or implementation handbook).
- Determine the appropriate “unstable/slide-prone” term in S&TC C6 and C7.
- Discuss and develop recommendation for C8 (blasting and excavation)
- Discuss and develop recommendation for C9 (saturated soil definition)

- Discuss the non-consensus item regarding the BMP in 11 AAC 95.290(d) (end-hauling and full-bench construction)
- Discuss and make recommendations for C10 (training needs)

To Do List

Marty Send summary sheet on use of “unstable/slide-prone” terms to I.G. *done 8/9/11*
 Send minutes from S&TC meetings to I. G. *done 8/16/11*
 Send draft minutes from this meeting to I.G *done 8/16/11*
 Send copy of Chatwin guide or link to it to the I.G. *done 8/18/11*
 Review Hartsog 1990 and send paper to Vinsel *done 8/18/11*
 Send chart of public safety options to Wolfe *done 8/9/11*
 Send minutes to public mail list

All: Review draft minutes and send edits to Marty
 Read abstracts for starred references in the bibliography
 Review the uses of “unstable/slide-prone” terms

Handouts

Agenda
 IG Contact list
 Mail list
 IG Organization
 White paper
 Scoping model/caveats and maps
 S&TC Scoping consensus points
 S&TC Phase 2 consensus points
 S&TC Phase 2 recommendations relative to regulations
 BOF December, 2010 minutes excerpts
 FRPA fieldbooks



FRPA Landslide Issues Implementation Group August 23, 2011 - Web conference to Juneau, Ketchikan, and Klawock, AK MINUTES - MEETING #2

Present: Marty Freeman, Bob Girt, Kevin Hanley, Kyle Moselle, Pat Palkovic, Paul Slenkamp, Greg Staunton, Mark Vinsel, and Ron Wolfe were present in Ketchikan.

Absent: Mary Edenshaw, Mark Kaelke, Karl Hagerman, Bill Rotecki, Bert Burkhart

Minutes. The minutes from the August 9, 2011 meeting were reviewed and approved.

Review of Science & Technical Committee recommendations.

C2 and C3am (unstable slope terms and definitions): The Implementation Group (IG) discussed how the various terms related to unstable slopes and slide-prone areas are used, whether a consistent term is needed, recommend definitions, and where the definitions should reside.

Freeman noted that the definition of “unstable slope or slide-prone area” does not mean that in a DPO or the other BMPs, each individual criteria would be mapped or addressed. The operator would map areas

that are judged to be unstable or slide-prone after considering the combination of slope and the other indicators, not the individual criteria such as areas of jack-strawed trees.

Wolfe reviewed input from the Sealaska attorney on use of the term “area” and proposed definitions for “slide-prone area” and “unstable slope” (*see handouts*). Wolfe asserted that “unstable slope” and “slide-prone area” are separate terms in the FRPA regulations and should have separate definitions. “Area” is a vague and broadly inclusive term. He proposed definitions built off the S&TC definitions. His proposal added “predominantly greater than 50%” for the slope gradient in both terms, and required that the five indicators be “prevalent” in the definition for “slide-prone area.” He recommended that the definitions be included in the fieldbook on “Implementing BMPs for Timber Harvest Operations” (the “purple book”).

Moselle said that the definitions for other important terms are in the regulations, and recommended that the definitions for these terms also be in regulation. Wolfe responded that the IG can consider broader options than the regulations, and suggested that if the definitions are included in the regulations that additional definitions might be needed for terms in the proposed definitions. Hanley agreed that the definitions should be in regulation, and noted that the regulations already use these terms. He said Wolfe’s solution for separating the terms could work. If “area” is the problem, Hanley suggested using the term “unstable or slide-prone slope” instead. Staunton said that there is good reason to keep the term “area” – it is necessary to look at a broader scale than “slope”. Operators and agencies need to be aware of landslide initiation zones and runouts as well as just the slope itself.

Wolfe raised concern that changing “area” to “slope” might create an impression of weakening the regulations. There could be a political downside to that, but he’s willing to do it if it improves the regulations. It’s appropriate to show slide-prone areas on DPOs. That is consistent with identifying areas we need to look at in more detail. However, where specific practices such as end-hauling and full-bench construction are required in the regulations, he is not comfortable using “slide-prone area.” We could include the indicators in the definition of “unstable slope” and just use that term. Girt said that from the working aspect, eliminating “slide-prone area” is an improvement, and you could use “unstable or slide-prone slope.”

Hanley said that the nature of slides is such that you don’t know the whole area that could be affected by a slide – it is highly variable.

Moselle said that Wolfe assumes that the regulation drafters meant something different by each of the “unstable” terms; the S&TC didn’t assume that and couldn’t figure out different definitions for them. Moselle suggested putting a concise definition in the regulation and then put the indicators in the purple book. We could put sideboards on “area.”

Palkovic said that changing “area” to “slope” wouldn’t change the actual practice on the ground for the three places in the regulations where the term “unstable slope or slide-prone area” is used. Staunton said that the main change from replacing “area” with “slope” would be in the regulations on the detailed plan of operations (DPO), not in the BMPs on specific field practices.

Wolfe said an example of the effect of the terms could be a Sealaska project with mass wasting and hydrology consultant Dale McGreer in a sensitive area. Sealaska Timber Corporation identified the area on a map, for Dale to conduct a detailed field review to identify on the ground specific places of concern. He said that operators would show “areas” of potential concern in a circle on the DPO maps – that allows some appropriate vagueness at the DPO stage.

Hanley said that he understands “slide-prone slope” to mean that there is evidence of past sliding, that there is a demonstrated tendency to slide. On an “unstable slope” there is no apparent evidence of past slides, but there are other indicators of instability.

Moselle asked whether an “unstable slope” is a slope with “unstable soils” based on the soil definition. Freeman said no, not all unstable slopes have soils with the characteristics in the “unstable fill material” definition.

Vinsel noted that the 1990 report by Hartsog in the bibliography refers to roads on slopes up to 90% gradient – does that still happen? Staunton said that it occurs, but only rarely because of the cost of road construction on such steep slopes. A road might cross a short stretch of ground that steep.

Staunton said that under 11 AAC 95.290(b)(3) (excavation and blasting) that if a site is not on an unstable slope, but below it or adjacent and above it, operators should consider the “area” for blasting in saturated conditions. He advocated keeping “unstable slope or slide-prone area” together in the definition. Wolfe said that the S&TC recommendations combined two terms into a single definition. Staunton agreed with that concept. The terms mean different things but can be put together – you can define them collectively.

Vinsel said that the geotechnical relation to the slide-prone slope is what requires consideration. He agreed that “area” needs to be tightened.

Wolfe said that it is good to consider a regulation clean-up as long as we can demonstrate that it strengthens or improves them.

Wolfe suggested that a “slide-prone area” should be delineated on the DPO as a trigger to a closer look. There was general agreement on this point. Palkovic said that the DPO process already essential identifies general areas. Wolfe further suggested that the regulations with specific BMPs (e.g., 11 AAC 95.290 – road construction) require specific actions, and the IG should find definitions that are consistent with that.

Staunton suggested using “topography exhibiting a gradient” rather than “slope” or “area” because “topography” pertains to a set piece of ground. Hanley said the definition could refer to geomorphology such as alluvial fans where you don’t want to put a road.

Wolfe reiterated his concern with continuing to use “unstable slope or slide-prone area” as a single term. Staunton said that “or” creates a different link in the term than “and” would.

Moselle suggested providing a general definition for “slope” (e.g., land with a gradient) and “area” to narrow the terms. Staunton said that “topography” can include both a broad area or a narrower zone. Hanley observed that on the ground “slope” and “area” are used consistently and there haven’t been problems.

Moselle commented that on Mitkof island, the Mental Health Trust has been looking at parts of the hillside more discretely than the Mitkof homeowners. He said that FRPA doesn’t grant a permit or prohibit activities, but it guides actions to be responsible. Wolfe responded that Mitkof is a unique situation that has forced consideration of global fixes.

Palkovic commented that FRPA includes other vague terms, but it relies on knowledgeable people in the field. Wolfe agreed that the success of FRPA depends on field work.

Moselle emphasized that one of the driving factors for the S&TC in developing the indicators in their proposed definition was to equip operators with information to help recognize potential hazards in the field.

Freeman summarized the points of agreement:

- The DPO requires a broad look at areas of concern. At this stage some vagueness is beneficial. “Area” is an appropriate term at this stage of operations.
- A more specific, consistent term is appropriate in the BMPs that require specific actions on the ground.

Palkovic asked about whether we could provide tools for identifying all areas susceptible to slope failure or instability rather than a definition. She noted that the purple book doesn’t include all BMPs, just those that are part of the compliance monitoring program. Staunton agreed that developing the tool for identifying hazards is the intent of the S&TC process. Freeman also noted that the process to develop or revise the purple book has been primarily an internal DNR process, not a public or Board-driven process. Wolfe said that made it easier to change the purple book if needed.

Moselle noted that training on the indicators will be part of the training recommendations, too. Moselle reiterated that the regulations could include a short definition of “unstable slope or slide-prone area,” and then the indicators could be included in the purple book. A possible definition could be, “a hillside with a tendency to mass wasting.” Wolfe said that this consistent with the approach in other regulations.

The group tentatively agreed to drafting a short regulatory definition for “unstable slope” for the specific BMPs and using “unstable area” with the indicators in the DPO regulations.

Slenkamp said that the purple book was created for operators to explain how the compliance monitoring score sheet is used. It doesn’t carry much clout. Palkovic agreed. Staunton said that it is also used in training.

Wolfe said that he is looking for a place that the information in the indicators can reside that helps the operators and agencies. Slenkamp agreed. He suggested putting it in the purple book and using the book in training on this issue. If the indicators prove useful after some field experience then they could be added to the regulations.

Girt commented that he didn’t recall incidents of conflicts over identifying unstable areas.

Palkovic hesitated to use the purple book for this purpose – the green book (the regulations) has been the real reference.

Moselle suggested putting the indicators in 11 AAC 95.220 (DPOs) with “should consider” language. Wolfe said that he is less comfortable having the indicators in the green book, and prefers using the purple book. Palkovic said that the “should consider” language is out of place. Girt noted that the Group already included “should consider” in C6.

Palkovic asked what would happen if a slope <50% gradient has unstable characteristics. Wolfe said that FRPA allows discretion in the field. DOF could use a directive or stop work order if they believe a slope is unstable.

Palkovic said that operators do ask what constitutes an unstable or slide-prone area. Vinsel stated that having the indicators in the DPO regulations for the purpose of triggering a site visit is appropriate.

Freeman reiterated that the S&TC wanted to provide guidance for identifying unstable slopes in the field, and that they recognized that “slopes >67%” don’t cover all unstable slopes.

Wolfe remained concerned that including the indicators in the regulations could be a factor in future litigation over landslides.

Staunton said that dropping “area” from 11 AAC 95.290 raises concerns about causing instability.

Moselle noted that landslide initiation zones often occur in forested land rather than in the actual clearcuts. Hanley asked how the regulations would apply if an initiation zone is outside the cutting unit. Freeman noted that the introductory language to 11 AAC 95.220(9) specifies that the required information is for areas that are “located in cutting units or traversed by roads.” She suggested that “landslide scar” would include the initiation zone.

Slenkamp reiterated that the intent is to identify factors that lead to taking a second look at an area of concern.

Palkovic asked about the use of “susceptible to mass wasting” in a proposed definition for “unstable slope.” All slopes could be “susceptible.” Freeman said that the intent is to find a term higher on the scale of likelihood. Hanley said that the test goes back to the definition of “mass wasting” which refers to “significant masses of earth.” Girt suggested other adjectives such as “sensitive,” “liable,” or “prone.” Wolfe suggested “inclined to” or “having a tendency to.” Freeman briefly reviewed the S&TC discussion on “significant” and “likely.” These terms are used widely in FRPA and the regulations and the S&TC decided that the standard dictionary definitions were appropriate to cover the diverse ways they are used.

The group agreed that the definition should include both sites with evidence of past landslides and those with slide potential based on a combination of the site factors. They agreed to use “exhibiting mass wasting or where mass wasting is likely to occur.”

Freeman asked whether the Group thought the indicators should be included in the purple book. Moselle said that the purple book assesses what you do on the ground. Palkovic said that the purple book is how DOF rates how well a BMP has been implemented. The Act and regulations are the actual standards. Wolfe added that the purple book is also guidance for what the agencies meant by the regulations. It’s OK to look to the purple book for additional clarification or explanation. Palkovic countered that explanations area usually in the green book. Hanley agreed.

Moselle said that that for example the proposed changes to 11 AAC 95.360(c) would add a new BMP. Part of the follow-through would be including the new BMP in the purple book, and notes in the purple book could provide the indicators as background information. Palkovic noted that the purple book currently includes only .360(c)(1)-(3). Moselle recommended adding guidance for the new BMP in the purple book. Vinsel asked whether the IG could recommend adding guidance for .360(c)(5) and (6) to the purple book also. Freeman said yes, but should check first on why they were not originally included.

Staunton and Moselle said that the indicators are needed for DPO preparation and harvest and road planning, but are less important when implementing specific BMPs in the field – at that point the discussions between operators and agency staff are key.

Slenkamp and Girt commented that FRPA works well. There have not been serious issues over this question. Hanley said that it is still helpful to have a sentence referencing the indicators for cable yarding and landing BMPs. Palkovic would still like to have the indicators in the definition in regulation.

Staunton said that at the DPO stage, DOF wants to find out about potential problems from the operator and we should provide them the indicators. Then if there are concerns, the agencies do a field visit with professional foresters and biologists and the operator and assess whether there is a slide-prone area. If the forester thinks it’s slide-prone, the operator can disagree and they can discuss it. The forester can assert his position in a directive, and the operator can appeal. We can let the process run its course – the questions are in the arena of judgment at that point. It allows the professional to make the decision.

Palkovic emphasized that FRPA is not a permit, and it puts the primary responsibility of the operator, for example in stream identification, BMP implementation, and unstable slope identification. On other standards, we are upfront about what's expected and put it in the regulations. The DPO review is a safety net. Sometimes inspections aren't warranted. Sometimes issues may arise in the field that weren't identified ahead of time. Operators have the responsibility to think when they're out there.

Slenkamp commented that the issues are protection of water quality and fish habitat. In the photo [shared by Palkovic] of a slide near Natzuhini, there weren't impacts to fish habitat. We need to allow flexibility to respond to ground conditions, like a patch of blue clay. Operators have to address these conditions even if they didn't identify them ahead of time in the DPO.

Hanley said that it comes down to the amount and quality of information provided in a DPO. The agencies might not go out for a field inspection if there isn't a red flag in the DPO. Sealaska's DPO have 5-meter contours, which is abnormally good. Other DPO maps are often deficient. This relates to training needs for DPO preparation.

Slenkamp stated that operators usually monitor operators to make sure they operate in their own and the landowner's best interest. Operators may have to be told to do certain practices, e.g., end-hauling. If reviewers use good topographic maps they can come up with the same level of information that Sealaska has.

Hanley stated that he would like to reference the indicators in the definition of "unstable area" in 11 AAC 95.200(a)(9)(A). He wants to get that information out to operators so that they are considered, for example, the side-rod on-site should know them.

The IG agreed to include the indicators in the definition of "unstable area" in 11 AAC 95.220(a)(9)(A) and in training needs. Palkovic said that it's important to include them in the regulations, if they aren't unintended changes could happen like in a kid's game of telephone. Putting them in the regulations keeps the information stable.

Staunton said that a trained operator will recognize an uncomfortable situation in the field. Leading him to evaluate the indicators won't gain much with a shovel operator if he's not told to use them by the person submitting the DPO. It's different for the indicators of saturated soil conditions. The instability indicators (e.g., a high-density of zero-order basins) may or may not be seen by a shovel operator in the field. Wolfe said that there's always a challenge getting information to operators on the ground. The engineer will flag in the road route, not the shovel operator.

Girt asked about other avenues to get this information out. It's important. Wolfe recounted that prior to 1998 the DOF had a small green field manual that largely became obsolete when the regulations were adopted in 1993. Options to disseminate information on the indicators could include the purple book, the regulations, or a new field manual. Slenkamp said that the purple book is well-received by the operators, along with training. It would be good to put more emphasis on training. Wolfe agreed that the engineers use the purple book. He added that in the past DOF had held training workshops that were well-attended. Staunton said that DOF still provides agency and operator training. They do it annually with Sealaska.

Slenkamp stated that the industry should make sure their people on the ground are familiar with FRPA. The industry is so small the key field people are usually familiar with the Act but an annual refresher is useful.

Palkovic said that that beyond the formal training presented by Staunton, there is also impromptu training that occurs during field inspections, etc. Wolfe said that on-the-ground interaction is irreplaceable, but it

glad to hear that periodic training sessions are also available. A 3-day session would be a huge commitment for operators, but a 1-day session in Ketchikan or on Prince of Wales Island is doable. It's hard to find dates that work for everyone, so be sure to get dates out well in advance.

S&TC C2. Change the terms “unstable slope” and “unstable or slide-prone slope” to “unstable slope or slide-prone area” wherever they appear in the regulations. [Note: this amends the term used in 11 AAC 95.220(a)(9)(A) and .290(d)(2).]

IGC C7. Use the term “unstable area” with regard to the DPO, and use the term “unstable slope” in the other BMPs requiring specific actions. (See definitions in IGC C8)

C3am. “Unstable slope or slide-prone area” means a slope or area, generally in excess of 50% gradient, where one or more of the following indicators may exist. Slide risk depends on the combination of factors at a given site.

- landslide scar initiation zones,
- jack-strawed trees,
- gullied or dissected slopes,
- a high-density of streams or zero-order basins (source basins for headwater streams), or
- evidence of soil creep.

The S&TC recognizes that slope dissection is a significant indicator of slide risk, but difficult to assess – closely spaced dissections are a red flag, as are few dissections that funnel to a common collecting area. The S&TC recommends that the procedures in Chatwin, et al., 1994 be referenced in assessing landslide risk. One rule of thumb for assessing frequency of dissection would be where dissections are so closely spaced that they preclude split-yarding. This distance is approximately equal to tree height.

The citation for Chatwin et al., 1994 is:

Chatwin, S. C., D. E. Howes, J. W. Schwab, and D. N. Swanston. 1994. A guide for management of landslide-prone terrain in the Pacific Northwest. 2nd ed. British Columbia Ministry of Forests and U.S. Forest Service. 218 pp.

IGC C8 Subject to review of the whole package of recommendations at the next meeting and a final determination of where the indicators should reside with regard to the specific BMPs, the group agreed to the following terms and uses to replace “unstable slope or slide-prone area.”

Revise 11 AAC 95.220 (a)(9)(A) as follows:

- “(9) the following slope information for areas that are located in cutting units or traversed by roads:
- (A) any known unstable [OR SLIDE-PRONE SLOPE] area. For the purposes of identifying unstable areas under this section, consider sites with slopes generally in excess of 50% gradient, where one or more of the following indicators may exist.
- landslide scars,
 - jack-strawed trees,
 - gullied or dissected slopes,
 - a high-density of streams or zero-order basins (source basins for headwater streams), or
 - evidence of soil creep.”

For the regulations that require specific actions in BMPs (11 AAC 95.290, .340, .345, and .360) use the term “unstable slope” and add a definition to the regulations :

“Unstable slope” means a slope exhibiting mass wasting or where mass wasting is likely to occur.

"Mass wasting" is already defined in the regulations as “the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity.”

NOTE: There was **not consensus** on whether or not to include the indicators in definitions of “unstable slope” or “unstable area” in the regulations with specific BMPs. The group did agree that it would be all right to include the indicators in the purple book.

Palkovic described how the DOF compliance monitoring program evolved. It began with Bruce Johnson doing all compliance monitoring, then was expanded to all the FRPA foresters, and a checklist was developed for selected BMPs to monitor. Finally the purple book was developed for training monitors and operators. Girt commented that 11 AAC 95.830 says that the Board, agencies, and industry will all participate in review of FRPA effectiveness.

Staunton noted that there are already similar indicators included for other BMPs in the purple book. It’s not a problem to add these indicators to the purple book.

Hanley noted that alluvial fans are also inherently unstable, especially with regard to a road undercutting a toe-slope. Wolfe asked why alluvial fans weren’t included in the S&TC recommendations and suggested that they may not be in steep areas and the S&TC focus was on landslides. In the DPO context, it may be reasonable to add consideration of alluvial fans. Slenkamp stated that alluvial fans are typically on flat ground, in the depositional area. They aren’t relevant to landslide issues, but they present other stability issues. Hanley agreed that they are more relevant to road construction. Girt said that he thins of alluvial fans as a site where something unstable has stabilized. They have different issues like creeks that move over time. Their slopes are usually <10%.

The IG agreed not to include alluvial fans in the indicators for unstable slopes.

S&TC C5am/IGC3 (unstable fill material): Pat Palkovic reported that she concurred with the IG’s consensus on S&TC C5am after review. Use of “unstable slope” is consistent with the prior discussion of terms.

S&TC C5am. Add the following term to the definitions in 11 AAC 95.950: “**Unstable fill material**” means organic debris, organic soil, or fine-textured mineral soils. A fine-textured soil has a texture of silty-clay, sandy-clay, or clay.

Change .290(b)(2) as follows:

11 AAC 95.290. Road construction. [...]

“(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, unstable fill material may not⁸ be used [IF IT IS UNSTABLE, FINE TEXTURED, OR PRONE TO MASS WASTING] and cuts must be minimized where fine textured soils are known or encountered; “

IGC3am. The Implementation Group concurs with S&TC C5am with the deletion of “slide-prone area”:

11 AAC 95.290. Road construction. [...]

(b) If constructing a road on a slope greater than 67 percent[, or on an unstable slope [, OR IN A SLIDE-PRONE AREA] is necessary, an operator [...]

(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, unstable fill material may not be used [IF IT IS UNSTABLE, FINE TEXTURED, OR PRONE TO MASS WASTING] and cuts must be minimized where fine textured soils are known or encountered;

S&TC C6 (cable yarding): Vinsel asked whether cable-yarding creates a lot of vibration. Moselle said no, but there butt-strikes can occur with partial suspension. Slenkamp elaborated that partial suspension really cuts down on impacts on the ground. Vibration is typically not an issue as long as the leading end of the log is not striking a lot of material. Hanley added that the disturbance is different for uphill and downhill yarding.

The IG agreed to change “unstable slope or slide-prone area” to “unstable slope” in S&TC C6.

S&TC C6.

Add to **11 AAC 95.360 Cable yarding: [...]**

(c) The following standards apply to cable yarding operations: [...]

(6) on unstable slopes or slide-prone areas, an operator shall minimize disturbance to soils, understory vegetation, stumps, and root systems.

IGC4am. Concur with inserting in **11 AAC 95.360**, but delete “or slide-prone areas.”

Add to **11 AAC 95.360 Cable yarding: [...]**

(c) The following standards apply to cable yarding operations: [...]

(6) on unstable slopes, an operator shall minimize disturbance to soils, understory vegetation, stumps, and root systems.

S&TC C6, cont.

Add to **11 AAC 95.360 or .340: In these areas, an operator should consider partial cuts, helicopter yarding, retention areas, or other techniques designed to meet these objectives.**

IGC5am. Revise as follows and insert in **11 AAC 95.340**, Harvest unit planning and design:

On unstable slopes an operator should consider techniques to minimize disturbance to soils, understory vegetation, stumps, and root systems. Examples of possible techniques include partial cuts, retention areas, and use of helicopter or skyline systems to achieve full suspension of logs.

C7 (tracked and wheeled harvest systems) Determine the appropriate “unstable/slide-prone” term

S&TC C7.

Add to **11 AAC 95.365. Tracked and wheeled harvest systems:** (a) A person may not skid timber or operate construction equipment or machinery in a water body catalogued as anadromous under AS 16.05.871, without written approval of the Department of Fish and Game, or in any other surface waters, marshes, [OR]non-forested muskegs, or unstable slopes or slide-prone areas without prior notice to the division except, that equipment may be operated on frozen surface waters, marshes, or non-forested muskegs without prior notice to the division.

IGC6am. The Implementation Group concurs with the deletion of “or slide-prone area.”

Add to **11 AAC 95.365. Tracked and wheeled harvest systems:** (a) A person may not skid timber or operate construction equipment or machinery in a water body catalogued as anadromous under AS 16.05.871, without written approval of the Department of Fish and Game, or in any other surface waters, marshes, [OR]non-forested muskegs, or unstable slopes without prior notice to the division except, that equipment may be operated on frozen surface waters, marshes, or non-forested muskegs without prior notice to the division.

C8 (blasting and excavation). Freeman explained that the S&TC recommended that the BMP be amended by deleting the modifying phrase as follows:

“(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(3) may not conduct excavation and blasting activities during saturated soil conditions.
[IF MASS WASTING IS LIKELY TO RESULT AND CAUSE DEGRADATION OF SURFACE OR STANDING WATER QUALITY.]

The S&TC felt strongly that with the combination of steep or unstable slopes and saturated soils blasting or excavation would probably cause landslides, that the landslides could be large, that the extent of the slide couldn't be predicted reliably, and that impacts to water quality were highly likely under this scenario.

Wolfe said that he understands why the S&TC would recommend removing the phrase, “if mass wasting is likely to result and cause degradation of surface or standing water quality,” but it is extremely near and dear to Sealaska's heart. As a practical matter, there will most likely be a link to surface water quality in these situations, but if there isn't, Sealaska wants to be able to go forward. Wolfe doesn't want to decouple FRPA from water quality impacts.

Girt noted that the charge to the S&TC and IG is to consider provisions that impact fish habitat or water quality. Why did the S&TC take the phrase on water quality out? Freeman said that the S&TC believed that the risk of slides under the conditions of steep or unstable slopes, saturated soils, and blasting or excavation that a slide will probably occur, that it has the potential to be large, and it is hard to predict how far it will go. They felt the risk of impacts to water quality was so great that blasting and excavation should not be allowed on these sites during saturated conditions. Vinsel said that if there's a pile of dirt it will end up in fish-bearing waters. Hanley emphasized that under these conditions mass wasting is so likely to occur that these activities should be restricted.

Wolfe reported that Bob Loescher, a member of the group that developed the 1990 FRPA, said that you can only regulate private owners for landslides if water quality degradation is at stake.

Moselle noted that the current regulation includes impacts to surface and standing water. Freeman added that the definition of “standing water” is a waterbody ≥ 0.5 ac with no outlet.

Slenkamp deferred to the 1990 FRPA process, and noted the lack of issues that have occurred in implementing FRPA. Landowners still want to limit incursions on their rights. If a landowner is negligent, they are still held responsible. He doesn't know if tweaking this regulation would do much.

Hanley gave an example where blasting at South Cholmondeley caused a slide that didn't affect FRPA waters because it went into marine waters. Is it acceptable to allow that if it is preventable? Staunton said that if you initiate a slide in these conditions, you can't guarantee where it will stop. An operator needs to act conservatively.

Palkovic also noted that landowners are required to reforest harvested areas to the extent feasible, and landslides can affect reforestation. The regulations do allow 10% of the harvest area to be below the reforestation standards. Wolfe said that as a forester, he is aware that a slide will impact the ability to reforest. However, we are talking about private lands and rights. He understands why the committee thinks the words are superfluous.

Moselle asked why the existing regulation doesn't include fish habitat. Freeman and Hanley explained that the DEC water quality standards determine what constitutes “degradation of water quality.” It is

based on the designated uses of the water, and in Alaska virtually all waters are designated for drinking water, which is the strictest standard. Fish habitat is covered by the strictness of the drinking water designation.

Girt said that if you eliminate the clause “and cause degradation to surface or standing water quality” but leave in the reference to “mass wasting is likely to result,” it is linked to the definition of mass wasting which involves “significant masses of earth material.” There could still be exceptions where mass wasting wouldn’t be “significant.”

Palkovic emphasized that the issue isn’t that you can’t blast, but that you should delay blasting until the soil is not saturated – it’s a timing issue, not a prohibition. Vinsel commented that saturated conditions can extend a long time in Southeast. Moselle countered that SE soils also drains quickly, and saturation typically doesn’t persist a long time. Slenkamp said that low areas could remain saturated.

Girt stated that the phrase should remain in place – it’s what defines “significant.” Moselle disagreed. He said the phrase is a modifier, not a definition.

Vinsel described a slide on the Thompson River in British Columbia that blocked a whole river that is wider than Wrangell Narrows. There are risks there to fish and other uses, and it relates back to the Mitkof homeowners’ concerns, but it is outside FRPA because it is salt water.

Palkovic said that she understands the private concerns and suggested that other regulations could be used to restrict blasting in these conditions on state and municipal lands.

Staunton tried to think of when as an operator he would want to initiate a slide – he wouldn’t want to expose the people or public resources at risk, and you don’t know where the runout will stop.

Wolfe reiterated that he understands the discussion as a practical matter, but the premise of jurisdiction on private land is tied to public water resources.

Staunton said that the S&TC concluded that you can’t prevent all slides, but given the combination of conditions in this BMP, the stage is set for problems. Moselle said that this BMP is one place where you go a long way toward avoiding slides.

Palkovic emphasized that the restriction in the BMP would be temporary – only during saturated conditions. It just affects timing.

Vinsel asked about the extent of the road-building season. Wolfe said that the industry would like flexibility to build roads year-round, but that’s not always practical.

Hanley said that it is unavoidable to think about the public safety issue in this context because blasting under saturated conditions is so likely to result in a slide. The S&TC said that there would be impacts to safety, and the only opportunity to address them is after the fact if a slide occurs.

Moselle noted that fish are protected under either alternative. Hanley countered that we don’t know the extent of a slide before it occurs, and it may reach fish habitat. Staunton said that as an area forester, if he could walk to a stream within a mile below a potential slide path and an operator proceeded with blasting or excavation in these conditions, he would write it up as a FRPA violation.

► There was not consensus on this issue. The timber industry and private landowner representatives present feel strongly that the regulation should not be changed, that it is an unjustified incursion into private property rights if the connection to degradation of water quality is not maintained. The other

representatives present supported the S&TC recommendation because of the high probability of landslides and water quality impacts occurring, and because the change affects timing of blasting and excavation during saturated conditions, but it is not a prohibition.

The IG agreed that this issue should be elevated to the Board of Forestry.

C10 (training needs): The Group generally agreed with the training recommendations. The terms were changed to be consistent with the terms recommended by the IG. Girt noted that he will have comments on the slope stability indicators when the Group addresses S&TC C9. Staunton commented that the regulations don't talk about landslide runout zones, but you need to think ahead about where slides might go.

Girt asked whether training needs are targeted at operators only. Freeman said they also address agency staff and landowners.

S&TC C10.

Training needs include,

- Identification and mapping for DPOs of “unstable areas,”
 - information available from the scoping maps, digital elevation models, and other sources to identify and map these areas
 - identification of slopes <67% that are unstable, including application of the indicators listed under this definition
- Identification of “saturated soils” and understanding of the indicators for saturation on slopes
- Assessment of likely runout zones for potential slides (e.g., see Chatwin et al., 1994 illustrations)
- Connection between FRPA standards and water quality standards, and sources of information on water uses
- Any changes adopted in regulation or made to the DPO form.

IGC9. The IG concurs with the S&TC C10 on training needs with the following changes.

Training needs include,

- Identification and mapping for DPOs of “unstable slopes” and “unstable [SLIDE-PRONE] areas,”
 - information available from the scoping maps, digital elevation models, and other sources to identify and map these areas
 - identification of which slopes <67% are unstable, including application of the [ALL] indicators listed under this definition
 - [WHICH SLOPES <67% ARE UNSTABLE OR SLIDE-PRONE]
- Identification of “saturated soils” and understanding of the indicators for saturation on slopes
- Assessment of likely runout zones for potential slides (e.g., see Chatwin et al., 1994 illustrations)
- Connection between FRPA standards and water quality standards, and sources of information on water uses

Any changes adopted in regulation or made to the DPO form.

Next meeting

Tentative dates were set for a half-day (8:30-1:00) video conference on September 27 or 28, 2011. Video conference sites will be available in Juneau and Ketchikan. IG members in other locations are encouraged to join one of those sites, but can connect in for audio and web conferencing from other sites if necessary.

Agenda items

- Review any feedback from the August 30-31 Board of Forestry meeting
- Discuss and develop recommendation for C9 (saturated soil definition)
- Discuss the non-consensus item regarding the BMP in 11 AAC 95.290(d) (end-hauling and

- full-bench construction)
- Final review of C10 (training needs)
- Overview of complete package of IG recommendations

Handouts

- Agenda
- Minutes from meeting #1, August 9, 2011
- Excerpts of regulations using terms involving “unstable”
- Memo from Jon Tillinghast, Atty. to Ron Wolfe re definition of “area” in proposed FRPA regulation changes
- Proposed definitions and application of “slide-prone area” and “unstable slope” from Ron Wolfe

Other attendees

Brian Kleinhenz, Sealaska

TO DO

Freeman:

- Distribute minutes from meeting #1 to public mail list *done 8/24/11*
- Brief Board of Forestry on Implementation Group process to date *August 30-31*
- Review draft definition for “unstable slope” with AGO regarding use of “slope” in both the term and the definition *done 9/21/11*
- Send paper on “significant” and “likely” to S&TC *done 8/25/11*
- Check on why e.g., .360(5) and (6) were not included in the purple book.
- Send S&TC Water Quality Standards briefing to IG *done 8/25/11*

All:

- Review the minutes, especially consensus statements.
- Review the S&TC minutes regarding S&TC C8 (blasting and excavation in saturated conditions)
- Review the S&TC minutes on the non-consensus point on 11 AAC 95.290(d)



**FRPA Landslide Issues Implementation Group
10:30-4:00, September 27, 2011
Video conference: Juneau and Ketchikan
Minutes - MEETING #3**

Present: Marty Freeman, Kevin Hanley, Kyle Moselle, Mark Vinsel, and Ron Wolfe at Juneau video conference site; Bob Girt, Pat Palkovic, Paul Slenkamp, Greg Staunton at Ketchikan video conference site; Mark Kaelke on teleconference in Juneau; Karl Hagerman on teleconference in Petersburg

Absent: Mary Edenshaw, Bill Rotecki, Bert Burkhart

Minutes. The minutes from the August 23, 2011 meeting were reviewed and approved.

Board of Forestry feedback. Freeman reported that the Board of Forestry (BOF) reviewed the non-consensus items from the Implementation Group (IG). They unanimously recommended leaving the, “*if mass wasting is likely to result...*” language in the best management practice (BMP) on blasting and excavation under saturated conditions in 11 AAC 95.290(b)(3). Key points in the discussion included:

- The threat to water quality is still covered if a slide is likely.
- There is not a 100% chance that slides will occur even under these conditions, and site-specific topography may make slides unlikely at some sites – at those sites, it’s an unnecessary cost to the operator.
- The explicit link to water quality is part of the foundation of FRPA – restrictions on private owners must be tied to protection of public resources; mass wasting on private land is not an issue if it doesn’t cause water quality degradation.
- Some I.G./S&TC members expressed the S&TC concern that slides will occur under these conditions, they have potential to be large, and their extent relative to waterbodies is unpredictable; they also noted that the restriction on blasting and excavation is temporary during saturated conditions.
- Not all BMPs explicitly tie back to water quality and fish habitat, even though that is the overarching concern, but the specific tie is included for BMPs with costly measures attached.

The Board discussed options for where to incorporate the indicators regarding the definition of “unstable slope”, but not intervene at this point, recognizing that the IG will discuss this issue further regarding “unstable slope” and “saturated soils.” The discussion included the following.

- Opinions varied as to whether the “purple book” is actively used by operators -- use may vary by region and operator.
- Perspectives varied on the difficulty of amending regulations if changes to the indicators are warranted in the future. One suggested the indicators could initially be put in the purple book, then moved to the regulations if they hold up over time.
- Some noted that identifying mass wasting potential hasn’t been a big issue in practice.
- Some stated that the emphasis needs to be on training and prevention in the planning stage.

Freeman reported that the next Board meeting is November 29-30. She will report to the Board on the IG recommendations. The Board will be asked to consider the package of recommendations, and think again about the issue of public safety in light of the continued input from the MHHA and the upcoming legislative session.

Public comments

At the Board meeting, Suzanne West from Petersburg re-emphasized the Mitkof Highway Homeowner’s Association (MHHA) concerns about public safety and landslides. The Division of Forestry also received a letter from the Association with concerns about the Board’s position, and included photos and text of a recent landslide that reached the Mitkof Highway. The IG discussed the letter.

Slenkamp noted that the slide reported in the letter demonstrates that slides occur with or without forestry activities. He noted that Ketchikan had 30 inches of rain from mid-August to mid-September, including the end of a typhoon. These were extreme circumstances. He checked on prior Mental Health Trust timber harvests along the Zimovia Highway in the Wrangell area to find out if there were any slides during this period, and there were none.

Moselle said that the events described in the letter highlight the need to address this issue outside forestry. This is a key area for landslides and public safety, along with Hollis. He asked who else the Association had contacted about addressing the safety issue.

Freeman said that the MHHA had worked with Rep. Wilson on legislation. Hagerman said they worked with Rep. Wilson to draft a bill, and have spoken to the Petersburg City Council. MHHA disagrees with excluding public safety from the issues addressed under FRPA. The City Council is sympathetic. MHHA is not asking the City Council for action at this point. It seems like the Petersburg area has been hit with a number of slides recently, including the one described in the MHHA letter in their area of concern. Slides happen naturally, and they don’t want additional risks. Hagerman said he is interested in

the IG process, and is encouraged that the Board will have another opportunity to weigh in on the public safety question. The Petersburg Council may be asked to look at a zoning change, but Hagerman doesn't know what that would look like yet.

Palkovic asked whether the slide was in a V-notch, and whether it crossed the road. Hagerman replied that it was in a chute, and cleaned the chute down to the bedrock. The mudflow from the slide swept into the road; the guard rail retained the trees.

Palkovic noted that there was a site in Ketchikan with a steep slope above a highway, then a bench, and then more steep slopes. It was cut on the steep slope above the road, and is now being developed for a rock pit. There have been some slides, but it was not a FRPA issue because it does not meet the applicability standards for FRPA. Even changing FRPA regarding public safety wouldn't have prevented that.

Vinsel noted that West commented to the Board that local people agree that it would be dumb to log the slopes above the Mitkof Highway. He asked whether there is consensus on that in the Petersburg area. Hagerman responded that there is not a clear consensus. The MHHA is passionate about this issue and some others are sympathetic. There are also people who want to log on Mitkof, and in general are pro-logging. He doesn't know whether the City Council has ever voted in support or opposition to their proposals; he doesn't know of any resolutions on this issue.⁹

Hanley said that the point of Wood's letter is to point out the inherent instability in this area. Adding logging would increase instability. Slenkamp said that isn't certain. Slides with unharvested forest cover tend to travel farther. Removing the weight of the trees and tree movement might prevent slides. He emphasized that he is not advocating that. He commented that a lot of minor sloughing occurred after the recent extreme weather, but the Mitkof slide is the most significant one of which he is aware.

Moselle asked whether if the BOF reversed its prior decision and opened FRPA to public safety, the state could be held responsible if they didn't take proactive measures to prevent slides other than not harvesting an area. Would the state have an obligation to treat an area to prevent slides? Kevin replied that FRPA applies only when logging and road-building occur, it doesn't create new responsibilities for preventative measures.

Vinsel asked whether the slide happened quickly – the letter says it “oozed.” Hagerman replied that it appeared to be rapid. Some city employees drove that road to work at 7:30 and there was nothing on the road; a half-hour later it was blocked.

Continue review of Science & Technical Committee recommendations.

S&TC C9: indicators for saturated soils. The S&TC recommended including the following indicators to help operators determine when saturated soil conditions exist along with the BMP for blasting on steep or unstable slopes under 11 AAC 95.290(b)(3):

- On cut-slopes, noticeable soil liquefaction or movement of large soil particles to the ditchline
- Significant water flow evident on the surface, exposed bedrock, or impermeable hardpan

⁹ Following the Sept. 27, 2011 meeting, Hagerman reported that the City Council had taken a formal position in Council Resolution #1922 on March 8, 2010. The resolution states support for a land exchange between the Mental Health Trust Authority and USFS because Trust land along the Mitkof Highway because this land “is considered to be at risk for landslide if logging or industrial development were to occur on the land” and “it is believed that any industrial real estate development above this populated residential and business area would be hazardous and could jeopardize lives and personal property.”

- Excavated or disturbed material performing in a liquid manner
- High rainfall rates in previous 24 hours, e.g., 6 inches in a 24-hour period, or prolonged periods of heavy rainfall
- Heavy rain following extended periods of freezing
- Heavy rain-on-snow events”

Freeman noted that the regulations already have a definition for “saturated soil,” and that this consensus point only applies to 11 AAC 95.290(b)(3) (blasting and excavation). It does not apply to 11 AAC 95.365(d) (tracked and wheeled harvesting systems) which includes saturated conditions in areas other than unstable slopes.

Girt said that he is an advocate of the purple book (BMP implementation field book), and uses it. Previously, the purple book may have been mostly for the regulators, but it should be used more by the industry. The cover of the book invites the industry to use it and help identify needed updates. It is a good resource for training. It should be used for the indicators. Slenkamp concurred, and recommended adding a line to the compliance monitoring score sheet regarding .290(b)(3).

Moselle noted that the Board’s consensus was to leave the wording in .290(b)(3) as is. If you monitor compliance, you take the purple book and score the implementation based on specific criteria. It’s not as simple as putting the indicators in the purple book – that wouldn’t tell how to score implementation. Freeman said that the IG could recommend that the agencies develop monitoring criteria.

Wolfe stated that the purple book has a secondary role beyond compliance monitoring – it serves as a field manual that doesn’t have to be in regulations. It gives operators more insight as to what the regulation means. In that spirit, these are good indicators for saturated soil conditions.

Moselle said that the indicators and the purple book should also be used in training with agency staff and operators.

Palkovic reiterated that the purple book doesn’t include all the BMPs, so operators shouldn’t rely on the purple book only. The green book has the full regulations. The old little green book was the regulations prior to 1993. Wolfe said there had been a different field manual as well.

Slenkamp stated that the definition for “saturated soil” is complete, but technical – it is appropriate for the regulations. The indicators provide a good explanation of the definition.

Palkovic advocated putting the indicators in the green book.

Hanley supported having the indicators in both the green and purple books. This wouldn’t be a precedent – for example, the Act and regulations both have additional information on stream types. He wants the broadest audience for the indicators. The green book gets more use statewide.

Palkovic commented that she has heard the purple book called the “Cliff Notes” for the regulations.

Moselle stated that the purpose of the purple book is in documenting BMP use and determining whether the BMPs are used correctly. It is not intended to determine whether implementation is necessary or effective. Freeman summarized that the purple book is targeted at compliance monitoring, not effectiveness monitoring.

Girt observed that the purpose of the IG is to determine how to implement the S&TC recommendations on the ground in a manner that works. The indicators are best used in a training effort.

Staunton asked whether we need to “paint a better picture” in the regulations for what we’re regulating.

Staunton and Vinsel noted that “saturated soil” is a temporary condition. Staunton said that saturated conditions probably aren’t still present when compliance monitoring occurs – the forester would have to look for evidence of problems that existed at the time of the operation. Consequently, the indicators should be made clear in the regulations, rather than included in the purple book for consideration afterwards.

Wolfe agreed that these are indicators of a temporary condition. There’s too limited a view of what the purple book can be. The indicators would create confusion in the regulations – they don’t comport with regulatory language requirements and more definitions would be needed. Because they are indicators, they should be in the purple book.

Moselle said that the S&TC development of the indicators was connected to the committee’s decision to delete the, “if mass wasting is likely to result...” phrase from the BMP on blasting and excavation under saturated conditions. The IG may need to reconsider what is needed for compliance. Moselle likes having the “unstable area” indicators in the regulations for the Detailed Plans of Operation (DPOs) – you can identify those ahead of time. You can’t do that with saturation on the ground. Saturated conditions are temporary and changing. Before we pick where the indicators go, we should review how they’re used. If the S&TC recommendation were retained, the indicators would have been criteria for prohibiting blasting.

Hanley said there is no difference – the indicators still identify when soil is saturated, and should be regulatory.

Wolfe stated that regulations are written to specific standards, and these indicators are different. They may be useful and helpful, but are inherently vague.

Hanley asked what problems would occur if the indicators were included in regulations. Wolfe said that they would require review by the Dept. of Law, who may see a need to restructure them. Hanley suggested proceeding with that review and seeing what they say. Wolfe disagreed, and recommended putting them in the field manual.

Hanley said that the purple book is intended to provide consistency in compliance monitoring – this would be a change. The operators should rely on the regulations. Wolfe countered that changing the purple book is OK. He agreed that operators have to understand the law, regulations, and the field manual. Hanley said that operators on Afognak Island don’t even use the purple book. Wolfe said that can be fixed with training. Moselle noted that the purple book is used in different ways by different people.

Slenkamp said that the blasting prohibition is in the regulations. The indicators identify conditions when saturation exists. The regulations apply in these conditions. If an entity is blasting under these conditions, they’ve violated the regulation. The original definition of “saturated soil” is complete.

Vinsel asked whether there are other conditions that should be included. Palkovic replied that the list covers the majority of appropriate indicators, and she would like having it in the regulations. It covers the great majority of saturated conditions. Operators do ask what “saturated” means, and don’t understand what “full voids” mean in the definition of “saturated soil.” The indicators would be helpful. Many places in the regulation don’t have definitions for every term, and we just go back to Webster’s [dictionary]. We may have to iron out more terms in the future, but we do that all the time.

Moselle said that there are other regulations that require understanding of terms. He agrees that the “saturated soil” definition is good, and agrees with Pat that operators don’t always know how to recognize saturation. The indicators provide good visual clues, but then why not do the same for other terms like “bank integrity?” That would expand the regulations unnecessarily.

Wolfe observed that it is not clear that this has been much of an issue in the past. The issue of landslides and FRPA was brought up by the MHHA, but the Board has not heard repeated reports of issues associated with mass wasting and forestry. The regulations always have terms that could be interpreted differently. If there’s a problem, then address it. He hasn’t heard that the definition of “saturated soils” is a problem. Palkovic reported that she has received questions about it.

Staunton noted that saturation deals with changing conditions. A soil scientist determining soil saturation would take a sample, weigh it, etc. We’re using a quasi-engineering approach through the indicators. We are trying to empower people in the field to analyze the conditions. The S&TC wanted to present the information to operators to help them deal with the changing field conditions through observations.

Moselle reiterated that the indicators were intended to help operators know when to stop blasting and excavation. They are a trigger. Their value was in establishing a threshold. Hanley disagreed. The indicators still identify saturated soils, then we leave it to the operator to decide whether a potential slide is likely to cause degradation. They wouldn’t have to stop blasting if there’s no water body within three miles.

Freeman polled the IG for their opinions on where the indicators should reside.

Hagerman said that the S&TC wanted the indicators in the regulations, and he supports that. The S&TC went through a lot of debate on these issues.

Staunton said that the indicators aren’t a “trigger.” They use the term “evidence...may include.” Hanley added that the S&TC minutes show that the indicators were developed before the S&TC recommended deleting the “if mass wasting is likely...” phrase.

Moselle said that the indicators no longer serve as a “trigger” because the Board of Forestry retained the existing language in the BMP. That changed his opinion of how strongly the indicators should be communicated.

Palkovic said that the indicators should be used to help “operators” determine saturation. The regulations apply to all participants in FRPA. She emphasized that the term “operator” has a specific definition under FRPA.

Wolfe asked whether 11 AAC 95.365(d) [use of tracked and wheeled harvest systems on saturated soil] has been a regulatory issue, and if so, how often? Palkovic replied that she has reminded operators of this BMP. It applies more to flat ground. It is an occasional issue.

Wolfe asked whether indicators are needed for saturated conditions on flat ground. Palkovic said that the existing definition is OK. Freeman noted that the S&TC specified that the indicators applied to saturation on slopes only, not to .365(d) which includes flat lands. Hanley noted that this BMP is not related to landslides.

Freeman summarized the options and opinions for location of the saturated soil indicators in the following chart.

Location of Indicators for Saturated Soil Conditions

Include in regulations (green book=GB)	Include in BMP Implementation book (purple book=PB)	Include in both GB and PB
<u>Support:</u> Karl Hagerman Pat Palkovic/Greg Staunton (DOF)	<u>Support:</u> Ron Wolfe Bob Girt Paul Slenkamp Kyle Moselle	<u>Support:</u> Kevin Hanley Mark Vinsel Mark Kaelke
<ul style="list-style-type: none"> • Operators should rely on the regulations which are the complete requirements, not on the PB which doesn't cover all the BMPs • The regulations provide the official definitions for key terms • Some operators don't understand the existing definition • Saturation is a temporary condition, operators need to know the indicators in advance, not at the time of compliance monitoring • PB is intended to be used with compliance monitoring, not as a "field manual" • Some operators don't use the PB • Using the GB will ensure the most consistent application of the indicators 	<ul style="list-style-type: none"> • Indicators in regs are confusing – additional terms would need regulatory definitions • These are "indicators" not regulatory standards • PB serves as field manual that doesn't have to be in regulatory format • It's appropriate for the PB to serve multiple functions, including acting as a "field manual" • Indicators no longer serve as a trigger for a prohibition; the threshold for the prohibition remains degradation, not soil saturation • Recognition of saturated conditions hasn't been a big problem in the field in the past 	<ul style="list-style-type: none"> • See comments on GB • Reaches the broadest audience

All Group members agreed that the indicators provide good information about recognizing saturated conditions and that use of the indicators should be included in training.

S&TC C3am: indicators for unstable slopes. The IG continued the discussion from the prior meeting on the appropriate location for the list of S&TC indicators for unstable slopes.

Wolfe said that indicators for unstable slopes have potentially expensive ramifications for the private owners. The stakes are higher for cost and implications to operations.

Moselle asked whether the indicators would be considered indicators of slopes where “mass wasting is likely to occur,” given the definition of “unstable slope” developed at the last meeting,¹⁰ Freeman said yes. Moselle wasn’t sure where, if anywhere, they belong in that case.

Palkovic asked why the IG would use “unstable area” in the DPO section if it is not used anywhere else in the regulations. She understands the intent but “unstable slope” and “unstable area” aren’t currently connected through the BMPs.

Staunton said that regulatory indicators aren’t appropriate to the situation with respect to “unstable slope” because it is a situation that requires judgment based on a combination of factors. In this case regulation should steer people to apply their best professional judgment in the field based on the specifics of the site.

Wolfe asked whether there is a benefit to making operators and others aware of these indicators. Staunton said there is a direct benefit. The indicators came out of time spent in the field by the S&TC members. These indicators were present at many problem areas. Wolfe suggested that they would be helpful in training. He leans toward putting them in the purple book. They are helpful and useful, but shouldn’t be in regulation.

Girt pointed out that the 10th and 11th bullets on p. 33 of the purple book under 11 AAC 95.290(d) [end-hauling and full-bench construction] have some indicators for unstable slopes and susceptibility to mass wasting. The purple book could be edited to incorporate the S&TC indicators. Wolfe agreed. Moselle noted that the first S&TC indicator is now incorporated into the definition of “unstable slope,” i.e., a slope exhibiting mass wasting.

Moselle said that a big reason for splitting “unstable area” and “unstable slope” was scale. Hanley disagreed, and stated that all the S&TC indicators apply to both slopes and areas. He asked if they could be included in the definition of “unstable slope.” Staunton and Wolfe said that would put them in regulation. Vinsel said that “unstable slopes” are subsets of “unstable areas.”

Moselle asked how “unstable slope” and “unstable area” would be different if the definitions both include the indicators. Wolfe said that is why the indicators for “unstable slope” should just be in the purple book.

Palkovic said that under the S&TC proposal, there wasn’t a need to differentiate between “slope” and “area.” If they are separated, and the indicators aren’t in the definition for “unstable slope”, an agency doesn’t have regulatory backing to tell an operator to go back and look at the indicators under the BMPs. Vinsel added that slope instability is not a temporary condition like saturation. If something is only in the purple book, an operator could challenge the need to consider the indicators.

Moselle commented that in the field, an agency would look to the “unstable slope” definition, look at the specific site, and use best professional judgment to identify whether mass wasting exists or is likely, then would look to 11 AAC 95.360 [cable yarding] to see whether the operator has mitigated concerns. The indicators don’t help enforce .360. Hanley replied that he doesn’t see the indicators as an enforcement tool, rather they are a way for the operator to be in compliance during layout and planning. That’s why he’d like the indicators plastered all over. Moselle stated that it’s not the indicators that must be followed, it’s the BMP – the indicators are just intended to be helpful.

¹⁰ Note from Freeman: I did check with the Attorney General’s Office on whether having “slope” in both the term and definition for “unstable slope” was a problem, but forgot to report the result at the meeting. The AGO confirmed that it was not a problem – they said the I.G. is defining a particular type of slope.

Hanley reiterated that not all operators use the purple book. Wolfe said that can be solved with training. Hanley noted that not all operators come to training and reemphasized the need to publicize the indicators widely.

Wolfe said that regarding the weight of law, we have BMPs, directives, and stop work orders. If the FRPA forester decides full-bench construction is needed, they can direct the operator to do it. Palkovic emphasized that when DOF issues directives and notices of violation, they have to go back to the statutes and regulations to do so.

Staunton observed that the easiest case for enforcement is when a situation is in black and white. In other situations, the parties would have to make their cases with one professional statement versus another. DOF first tries to exercise its authority other ways when conditions allow, for example through inspection reports. The indicators might make things a little easier, but professionals still must make their case based on judgment. Palkovic said that the definitions make it clearer – she likes having the specificity in regulation. Staunton countered that it’s not really helpful in the regulations if the “may” statement remains in the indicators. Palkovic disagreed – even with “may,” it helps. Staunton said that the indicators are already present in the DPO section to lead the operator in making a sound decision. If the operator is belligerent we have a different situation than one of ignorance.

In summary, the IG agreed unanimously that the S&TC indicators for “unstable slope” are helpful and useful, and should be included in training. They did not reach consensus on whether the indicators should also be in the regulations or the purple book. Opinions and support are summarized below

Include in regulations (green book=GB) and BMP Implementation book (purple book=PB)	Include in BMP Implementation book (purple book=PB) only
<p><u>Support:</u> Karl Hagerman, City of Petersburg Kevin Hanley, DEC Mark Kaelke, Trout Unlimited Mark Vinsel, United Fishermen of Alaska</p>	<p><u>Support:</u> Bob Girt, Higher Ground Pursuit consulting Paul Slenkamp, Mental Health Trust. Kyle Moselle, ADF&G Greg Staunton, DOF Ron Wolfe, Sealaska</p>
<ul style="list-style-type: none"> • S&TC developed the indicators based on field experience and studies, they exist in the great majority of sites with unstable slopes • Having the indicators in regulation will help clarify what is needed and aid enforcement; it will ensure that operators consider these factors • Knowledge of the indicators helps operators be in compliance with the BMPs • Not all operators use the purple book 	<ul style="list-style-type: none"> • Identification of unstable slopes needs to be done in the field based on site-specific conditions and best professional judgment • Enforcement is based on the BMP, not the indicators; DOF can direct the operator to use full-bench construction if they deem it necessary • Potential costs to operators are high • Training can ensure operators are familiar with the purple book

S&TC C8 (blasting and excavation) and Non-consensus item (end-hauling and full-bench construction). Freeman reviewed the history of these items. The S&TC unanimously recommended changing the BMP on blasting and excavation under saturated soil conditions as follows:

“11 AAC 95.290(b). If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]

(3) may not conduct excavation and blasting activities during saturated soil conditions. [IF MASS WASTING IS LIKELY TO RESULT AND CAUSE DEGRADATION OF SURFACE OR STANDING WATER QUALITY.]

The S&TC was split on whether or not to make a similar change to the BMP on end-hauling and full-bench road construction:

“11 AAC 95.290(d) An operator shall use end-hauling and full-bench construction techniques if mass wasting from overloading on an unstable slope or slide-prone area is likely to occur, or erosion of sidecast material is likely to occur and cause degradation of surface or standing water quality.”

The IG did not reach consensus on the blasting and excavation recommendation, and had not previously discussed the end-hauling and full-bench construction issue. At the August 30-31, 2011 Board meeting, the Board reviewed the the blasting and excavation issue and the discussion from the S&TC and IG. After considerable discussion, the Board unanimously recommended leaving the language in place. The also said the IG could continue its discussions, and if they have compelling information to share with the Board they can do that.

Hanley said that the Board had de facto made it's call on both issues. Wolfe concurred that the Board has spoken. Moselle noted that there is no change to 11 AAC 95.290(b)(3) with the combination of the Board's call and the IG decision to keep the term “unstable slope” rather than supporting the S&TC's proposed change to “unstable slope or slide-prone area.”

S&TC C10: training. The IG reviewed its prior recommendations on changing. The Group revised the language to clarify that “unstable area” and “unstable slope” are separate terms.

Hanley suggested adding training on mapping yarding settings in DPOs. Vinsel replied that the operators don't know all the detail for settings until they get on the ground. Wolfe concurred, and said there is interaction between road design and location and the landing setting and location. Girt said that he wants to give the operator some leeway in what happens on the ground. Staunton added that much depends on the skill level of the operator in forest operations – the advance engineering and site control are less specific than conditions in a contract for constructing most things of similar value. The industry is generally willing to manage the risk due to the environment in which they typically work. The IG agreed that the topic of map quality on DPOs could be a subject for training.

Palkovic noted that time available for training for agencies and operators is limited. Freeman suggested that there is an opportunity to look at various methods of delivering training – there may be ways to take more advantage of new technologies for distance learning, as well as building on the existing series of FRPA training notes. Palkovic noted that informal training during inspections is also useful. Wolfe said that targeted fact sheets could be helpful, for example to follow up on issues identified in the annual compliance monitoring report that DOF prepares for the Board.

Moselle asked whether DOF tracks mass wasting events. Staunton said no. Moselle asked whether that would be useful. We still don't have full understanding of how common these events are. Slenkamp said that we really only track those event that affect us. Moselle said tht there has been so much value out of the southeast road condition surveys. Perhaps a check box for mass wasting events on inspection reports could be added. Palkovic said that more information would be needed than a check box – how big was the slide? Did it reach a channel? Staunton questioned whether information would be statistically relevant because our perspective is generally with respect to active operations. DOF observations would e biased because they would not include events after an area was closed.

Moselle asked whether there are any questions that would be answered by such data. ADF&G wants to know when slides hit a fish stream. It happens rarely so ADF&G doesn't track slides proactively. Palkovic noted that even in the recent extreme weather, there were only a couple of slides. Staunton added that FRPA inspectors only see active operations, and many roads are put to bed. Inspections wouldn't provide complete feedback on slides.

Wolfe said that if there is a mass wasting issue that needs to be studied, it could be brought to the Board to help find ways to accomplish the work.

GC9. The IG concurs with the S&TC C10 on training needs with the following changes.

Training needs include,

- Identification and mapping for DPOs of “unstable [SLIDE-PRONE] areas, and identification of “unstable slopes” in BMPs
 - information available from the scoping maps, digital elevation models, and other sources to identify and map these areas
 - identification of slopes <67% that are unstable, including application of the [ALL] indicators developed by the S&TC
 - [WHICH SLOPES <67% ARE UNSTABLE OR SLIDE-PRONE]
- Identification of “saturated soils” and understanding of the indicators for saturation on slopes
- Assessment of likely runout zones for potential slides (e.g., see Chatwin et al., 1994 illustrations)
- Connection between FRPA standards and water quality standards, and sources of information on water uses
- Use of purple book – familiarity with information
- Mapping for DPOs, for example .220(6) re yarding techniques and location of landings

Any changes adopted in regulation or made to the DPO form.

Overview. The IG reviewed the overall package of recommendations (*see Consensus Points – S&TC and IC, September 29, 2011*).

► The Group agreed on the following terms:

- Landslide and mass wasting will both use the existing mass wasting definition in the regulations.
- “Unstable area” and indicators for unstable areas will be used in the regulation section on DPOs (11 AAC 95.220)
- “Unstable slope” will be used in all other BMPs that previously used the terms “unstable slope,” “unstable or slide-prone slope,” or “unstable slope or slide-prone area.” These include the BMPs on road construction (11 AAC 95.290), harvest unit planning and design (.340), landings (.345), cable yarding (.360), and tracked and wheeled harvest systems (.365). A new definition of “unstable slope” will be added to the regulatory definitions.
- Add a definition for “unstable fill material” to the regulatory definitions and using the new term in the BMP on balancing cuts and fills in road construction (11 AAC 95.290(b)(2))
- Leave “high risk of slope failure” as is in 11 AAC 95.280(d)(1) under slope stability standards.

► The Group agreed on the following changes to BMPs:

- Add a new subsection to the cable yarding BMPs (11 AAC 95.360) requiring that operators minimize disturbance to soils, understory vegetation, stumps, and root systems.
- Add a new subsection to the harvest planning BMPs (11 AAC 95.340) requiring that operators consider techniques such as partial cuts, retention areas, and helicopter or skyline yarding to minimize disturbance.

- Add to the tracked and wheeled harvesting BMPs (11 ACC 95.365) a requirement that an operator provide notice to DOF before operating tracked or wheeled equipment on unstable slopes.

► The Group recommended training on DPO mapping and identification of “unstable areas;” use of the indicators to identify unstable slopes, unstable areas, and saturated soils; assessment of slide runout zones, the connection between FRPA standards and DEC water quality standards, use of the BMP implementation field book (“purple book”), and changes to the BMPs.

► The Group deferred to the Board’s decision to retain the qualification that restrictions to blasting and excavation under saturated soil conditions (11 AAC 95.290(b)(3)) and end-hauling and full-bench construction (11 AAC 95.290(d)) be limited to conditions where mass wasting “is likely to occur and cause degradation of surface or standing water quality.”

► The Group did not agree on whether to include the indicators for “saturated soils” and “unstable slope” in the regulations or the BMP implementation field book (“purple book”).

After the overview, Palkovic recommended a change to clarify **IGC5am**, and the Group concurred as follows:

IGC5am. Revise as follows and insert in **11 AAC 95.340**, Harvest unit planning and design:

To minimize disturbance to soils, understory vegetation, stumps, and root systems on unstable slopes, an operator should consider techniques such as partial cuts, retention areas, and use of helicopter or skyline systems to achieve full suspension of logs.

Remaining steps. Freeman requested that the Group carefully review the minutes and the consensus summary, with particular attention to the consensus points and the summary of the positions on the non-consensus items. After the Group reviews the minutes and consensus items, DOF will brief the DNR Commissioner on the process and recommendations, and will present the recommendations and non-consensus items to the Board at the November 29-30, 2011 meeting. Freeman encouraged IG members to attend the Board briefing in person or by phone. If the Board endorses the recommendations, DOF will proceed with the regulation process, developing training, and making any changes needed to the purple book. The regulation process includes public, interagency, and legislative regulation committee review, review by the Department of Law, and signature by the Lieutenant Governor.

Vinsel asked whether DOF will respond to the letter from the MHHA. Freeman said yes, but that a response has not yet been drafted.

Vinsel asked for clarification on whether logging had occurred above the slide described in the letter. Hanley said that the USFS had previously harvested along the highway, but that the slide probably initiated above the second growth in the old harvest areas. Slenkamp confirmed that the initiation zone was 400-500’ above the old harvest level. Hagerman agreed that it was well above previously logged areas.

Vinsel said that these are inhabited areas underneath unstable slopes, not slopes open to harvesting above developed areas. Moselle said that the terms used by MHHA in the letter are those from the S&TC scoping maps.

Moselle emphasized that water quality impacts like those referenced in the letter are already addressable under FRPA. He noted that we are still hearing from MHHA about water quality effects and potential loss of life or property. The question remains – is DOF the best entity to regulate issues regarding loss of life or property if these problems are also occurring without harvesting.

Finally, Freeman thanked all the Group members for devoting time and care to this process.

Handouts

- Agenda
- Minutes from August 23
- Excerpt of August 31 Board of Forestry minutes
- Summary of consensus points – S&TC and IG
- September 24, 2011 letter from Mitkof Highway Homeowners Association to Chris Maisch and Marty Freeman, Division of Forestry

Other attendees

Brian Kleinhenz, Sealaska

TO DO

Freeman:

- Post minutes from meeting #2 ***done 9-28-11***
- Review draft minutes from meeting #3 with IG ***done 10-17-11***
- Send and post final minutes from meeting #3 to mail list and website ***done 10-19-11***
- Present IG recommendations and non-consensus items to the Board of Forestry ***November 29-30***
- Send BOF agenda and teleconference information to IG ***TBA when agenda available***

All:

- Review the minutes, especially consensus statements and description of non-consensus items.
done 10-17-11



EXCERPTS OF BOARD OF FORESTRY MEETING MINUTES -- DISCUSSIONS ON FRPA, LANDSLIDES, AND PUBLIC SAFETY

These excerpts include briefings to the Board and the Board's discussion of landslide issues related to FRPA from October, 2007 through December, 2011. They also include the Call to Order and Roll Call, Public Meeting Notice, and Attendance from each meeting. All public comments on the topic of landslides and/or public safety are included in these excerpts. Meetings addressing this issue occurred on the following dates.

- October 9, 2007
- February 12-13, 2008
- July 8-9, 2008
- November 12, 2008
- March 18-19, 2009
- August 11-13, 2009
- October 7-8, 2009
- March 17-18, 2010
- August 23-25, 2010
- December 13-14, 2010
- January 31, 2011
- March 31-April 1, 2011
- August 30-31, 2011
- March 20-21, 2012
- November 8-9, 2012
- March 26-27, 2013 (Draft)



MINUTES - Board of Forestry Meeting Tuesday, October 9, 2007 Atwood Building, Room 1270 550 W. 7th Ave., Anchorage

Call to Order and Roll Call. Chairman Maisch called the meeting to order at 8:35 a.m. Fairbanks and Juneau conference rooms were connected. Board members present were, Rob Bosworth, Matthew Cronin, Jack DiMarchi, Erin McLarnon, Wayne Nicolls, Bill Oliver, Rick Rogers, and Ron Wolfe. A quorum was present.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.)

Mitkof Homeowner's Association (MHHA) proposal. Ed Wood, MHHA, spoke to the Board by teleconference from Petersburg (*see handouts*). MHHA is a group of 95 homeowners and citizens commuting along the highway. The Association was formed in response to concerns about landslides from proposed logging on Mental Health Trust land. Wood said that the Board of Forestry has the responsibility to regulate all aspects of forestry. Most MHHA members are pro-resource extraction, and have family connections to logging businesses. For instance, Catherine Island landslides occurred in clearcuts that appear to have happened at the same time in fall 2005. MHHA has amassed a library supporting its beliefs. Some documents came from a Freedom of Information Act request to the USFS for documentation of landslide risks in this area. Trust Land Office logging didn't sound prudent. MHHA found that slides in a V-notch closed the highway, and two people were killed in an accident hitting debris that was incompletely removed. The MHHA retained an attorney and contracted with Douglas Swanson to study this area, an experienced scientist. Swanson reported that the slopes are too steep to log safely. Forrest Cole agreed that the USFS couldn't log this hillside under its current plan. Fighting this proposal has cost tens of thousands of dollars for the MHHA. When the Trust Land Office came to Petersburg, the word was that is was a done deal. The Trust Land Office said that logging would

have to be in accordance with FRPA. FRPA does not address steep slopes and landslide hazards. The Board needs to act on this issue. See the report from R. A. Combellick and W.E. Long: *Geologic Hazards in Southeastern Alaska: An Overview*, which says “3. Use of areas on or below slopes that have potential for severe failure should be restricted to open space, recreational, mineral, and agricultural use. Activities that increase susceptibility to slope failures (such as logging) should be prohibited or restricted if slope failures pose a danger to life or property. Critical facilities, homes, and other buildings for human occupancy should not be located in areas susceptible to major slope failures”

The USFS identifies high risk areas. Slopes of moderate gradient and higher should be prohibited from timber cutting if slides would affect private property and public safety. The state shouldn't allow settlement in high-risk areas either. Oregon and Washington forest practices standards were modified to incorporate public safety issues. Washington has landslide zonation protocols that were updated to incorporate public safety. Larry Mayo, a renowned USGS glaciologist, now retired, suggests that Alaska should adopt the same standards as the USFS for slope stability standards.

DiMarchi asked why the Mental Health Trust (MHT) is pushing the timber sale issues. Wood replied that previous MHT director Marty Rutherford put a stop on the proposal to try to find a way out. Acting director Wendy Woolf decided to try to sell the property, and Alcan was a likely bidder. When Harry Noah started as the current director he stopped all trust logging for the time being and is trying to do an exchange with the USFS to trade for mature young-growth on Prince of Wales Island. The Trust has to monetize their assets over time. Rutherford said the MHT might be able to get rid of the Petersburg parcel because they couldn't do anything with it. Noah said that if a land exchange is not possible, the MHT would either log it or sell it.

Maisch asked what the direction was when this property was given to the MHT. Freeman explained that it was original Trust land, and therefore didn't have prior use restrictions. Wood confirmed that, and said that timber is the only evident value.

Maisch observed that this is the first time an organization requested a change to FRPA. This could be a regulation change rather than a statutory change. He noted that the Board has successfully used a consensus process including scientific review and a stakeholder processes for other issues. He said the Board would need to review the science, but noted that much research has already been compiled.

Rogers said he needs to review what the Act currently says about slope stability – it's not silent on this issue. If there was a Class A water body at the bottom of the slope rather than homes, would FRPA prohibit that? If so, what is the difference? Is it an implementation, authority, or an interpretation issue?

DiMarchi asked whether the intent is to avoid logging where there is landslide potential, or where there is landslide potential that would affect homes. After a brief review it looks like there's a slam-dunk case that you can't log it and we don't know whether it requires a FRPA change. Err on the safe side. The MHT should recognize the liability after all the assessment of risk. Rogers commented that it's not as slam-dunk because landslides also occur naturally, and these slopes may be endangered anyway. Some slopes can be successfully harvested by helicopter – it gets complicated.

Curran reported that Alcan did submit a Detailed Plan of Operations (DPO) for the Mitkof Highway operation. DOF didn't accept the DPO because they didn't own the timber rights, and the MHT didn't want to submit it on their own. The plan proposed 95% helicopter logging of less than 10% of the basal area on the site, not clearcutting. It's not a clear case based on the information submitted. Wood said that the DPO estimated harvesting more volume than that. Curran replied that there was only one clearcut unit off the South end.

Cronin asked who prepares the logging plan in this situation. Maisch said that the MHT has timber consultants who do their timber sale layout. Curran said that the proposed sale with Alcan was prepared by the Trust Land Office. If Alcan buys the timber, it then submits the DPO as the timber owner and operator. Wood said that he has the DPO signed by Pat Palkovic of DOF, and it is for harvest of 22 MMBF. Curran stated that the timber hadn't yet been sold, so the DPO couldn't be accepted without joint MHT and Alcan signatures. Maisch said that we will check out the DPO status.

Wood reported that vehicle accidents have also occurred due to collisions with debris from timber sales in Wrangell, Ketchikan. He used Petersburg as an example, but said the proposed amendment is intended to be statewide.

Oliver asked whether risk to private property is a criterion for FRPA compliance. Curran explained that there is no FRPA requirement for that. The DPO is not a permit; it is a check for compliance with FRPA standards. Oliver asked whether risk to private property is a criteria covered by regulations. Freeman said that FRPA currently has authority for fish habitat and water quality on private land, and the MHT is private under FRPA. We would need to clarify whether we could address public safety issues by regulation without changes to the overall authority under the Act. Maisch agreed that DOF will need to check with the Attorney General's Office. Wolfe said that this would be a new area for the FRPA, and we should move carefully in expanding the intent. This is a serious undertaking, and there is another whole body of law that deals with liability.

Rogers agreed. We don't want to diminish the significance of the concern, but there is also civil law, tort law, and local government land use authority. Is FRPA the place to deal with issues of liability? It could lead to unintended consequences such as viewsheds. We may need to talk with the Department of Law. From a lay view, many liability laws are after the fact rather than preventative like the FRPA. We do want to prevent landslides before they happen, but we may be getting into zoning issues. Wood observed that the FRPA protects fish and bears, but not humans. Petersburg doesn't have zoning authority. Maisch said that DOF will check with the Attorney General's Office on our authority to address public safety issues by regulation under the existing Act.

Cronin said that the Board needs to look at this in the context of the Act and its jurisdiction. In terms of risk, would it be appropriate for DOF to assess the risk under the DPO that was submitted? The legal issue may be out of our hands.

Paul Slenkamp, DOF Southern Southeast Area Forester, explained that when a DPO is submitted, the agencies review if for FRPA compliance on a short timeline. The FRPA standards were met in the Mitkof DPO, but a contract between MHT and Alcan was never submitted. Kevin Hanley, DEC, noted that the FRPA slope stability standards only address road-building. Eliot asked whether other statutes would cover this. Rogers said he appreciates the irony that a fish is protected more than a human in this case. Wolfe objected. He said that FRPA is unique – there isn't a Mining Act or Subdivision Act that addresses these issues. There is another broad body of law that addresses these issues. If we go into that area, we have to do so judiciously and wisely. Maisch reiterated that DOF will check on FRPA authority with the Attorney General's Office. He noted that Public Safety statute AS18.70.320 only applies to fire, but doesn't know whether other statutes may provide help. DOF will get the Attorney General's Office response back to the Board.

Attendees

Mike Curran, DOF

Kristen Dunlap, OHMP

Mark Eliot, DOF-Fairbanks teleconference site

Marty Freeman, DOF

Kevin Hanley, DEC

Cal Kerr, consultant

Al Ott, OHMP (by phone)

Paul Slenkamp, DOF

Ed Wood (by phone)



FINAL MINUTES
Board of Forestry Meeting
Tuesday-Wednesday, February 12-13, 2008
DNR Office Building, 3700 Airport Way, Fairbanks

Call to Order and Roll Call. Chairman Maisch called the meeting to order at 8:42 a.m. Fairbanks and Juneau conference rooms were connected. Board members present were Rob Bosworth, Matthew Cronin, Jack DiMarchi, Erin McLarnon, Wayne Nicolls, Rick Rogers, and Nathan Soboleff for Ron Wolfe. Bill Oliver was absent. A quorum was present. **FRPA standards re landslides and public safety.** Marty Freeman summarized questions and discussion to date with respect to FRPA standards on mass wasting and public safety.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites. DOF has been investigating teleconferencing options. There are still two issues – first, using freeteleconference.com means that the cost for the state phone lines double because the service is not through the state’s contract provider. Second, the Attorney General’s Office has raised an issue over charging people to participate in a Board meeting. For this meeting, the call-in number is through the state system as in the past, and presenters are provided with access to the teleconference call-in number.

FRPA standards re landslides and public safety. Marty Freeman summarized questions and discussion to date with respect to FRPA standards on mass wasting and public safety.

The Mitkof Highway Homeowners’ Association (MHHA) raised concerns over risks to public safety from proposed timber harvesting on Mental Health land on Mitkof Island. The Mental Health Trust and its operator, Alcan Alaska Timber Corporation, submitted a DPO for operations. Based on review of the DPO and maps, and field inspection by DOF and OHMP, and subject to the agencies’ comments, proposed operations would be consistent with the Act and regulations. No operations have occurred to date. Prior to operations, a renewal notice must be submitted, or if changes are proposed to the original DPO, a Change in Operations must be submitted. No renewal notice or Change in Operations has been received at this time.

MHHA has requested that the following statement be added to FRPA:

“Activities that increase susceptibility to slope failures (such as logging) should be prohibited or restricted if slope failures pose a danger to life or property. Critical facilities, homes, and other building for human occupancy should not be located in areas susceptible to major slope failures.”

Three questions were raised at the October 9 Board meeting.

1. Can consideration of public safety be included in reviews of compliance with the FRPA and regulations? No, per consultation with the Attorney General’s Office, the existing act does not provide the authority to address public safety issues.
2. Can a consideration of public safety be added to the Act or regulations? Per consultation with the Attorney General’s Office, adding standards for public safety would require a statutory change to

the Forest Resources & Practices Act. Regulations on public safety could not be adopted without a change to the Act.

3. Do other authorities apply to public safety hazards from forestry operations? Yes – common law principles with respect to harm caused through negligence would apply. Also, local government with planning powers could adopt ordinances under Title 29 addressing public safety or use planning and zoning powers to address land use issues. Mental Health Trust operations would be subject to local ordinances.

Maisch added that the Division looked at the Oregon and Washington forest practices statutes. Both states added specific language on public safety in landslide hazard areas to their forest practices acts in recent years. Options for Alaska include local government action through ordinances, or adding language on public safety in landslide hazard areas to FRPA. If a FRPA change is undertaken, Maisch recommended doing it through a science and technical committee process. Opening the Act isn't taken lightly; there's always a risk of other changes, but we have been able to prevent that in the past. A public safety amendment would be new ground.

Rogers said that this is an interesting issue. The Act now is not a permit program. It's hard to understand what the change would look like if the state were to decide whether a landowner could log a slope based on a risk assessment. It would make it more of a permit.

Freeman said that in Washington, a notification must be submitted that leads to a determination whether or not an environmental impact statement is needed under the State Environmental Policy Act. Oregon established a matrix of risk to public safety and likelihood of mass wasting. Associated standards include progressively more restrictive BMPs up to a prohibition on harvesting in the highest risk areas. Both state programs require a field visit by someone with expertise in landslide risk.

Rogers asked whether a change to FRPA would shift the burden of liability for risk from private landowners to the state. If so, would the state act in an ultra-conservative manner if it would be accountable if something goes wrong. That has big implications for the industry.

Cronin commented that this issue has been raised on Mental Health Trust land, but would apply to other lands, and could be extended to anything. This takes the forestry act and opens it to complaints about any impacts. The issue might be better left to the legal entities. Freeman noted that the Washington and Oregon considerations for public safety apply only to landslides, not to all forestry issues. Cronin concluded that he didn't feel qualified to comment because of the legal issues.

Bosworth asked about the status of the Mental Health logging proposal. Freeman said that their DPO had been approved, but no operations have occurred to date. The Mental Health Trust would have to submit a renewal notice or a Change of Operations before proceeding.

Wood reported that Mental Health Trust leaders were going to visit the Alaska Congressional delegation this month to determine whether there is sufficient support for a 20,000-acre exchange involving several parcels, not just the 2,600 acres on Mitkof. The proposal would address other places like Deer Mountain in Ketchikan. He said that Harry Noah, the Trust's executive director, said that if the exchange effort fails, they would revisit the timber option.

DiMarchi observed that this issue hasn't come up before because most of our logging is in remote areas. If it's unlikely to occur elsewhere, he doesn't think we want to reopen the bill to accommodate Mitkof, when they are also playing other cards.

Rogers commented that he doesn't want to get bogged down in the specifics of the Mitkof situation. However, it does illustrate the complexities. There are multiple professional opinions on the level of risk for this site. If DNR tries to assess risk, there is some subjectivity. The Board doesn't have specifics of what the landowner proposed. The Trust seems to be taking steps to mitigate the risk, and there is a difference of opinion on whether that goes far enough. Some risks are inherent whether or not harvesting occurs; human activities can exacerbate the risk, but some evidence shows that slides on forested slopes move farther because of loading on the slopes.

Maisch agreed that FRPA should not become a permitting process, but it should have meaningful BMPs. A permitting process could shift some liability to the state. BMPs might not satisfy concerns – you might not harvest in some areas.

Wood stated that there are slopes up to 150% above his house. Freeman reported that the DPO for the proposed operation says that 25% of the helicopter units are on slopes >67%. Wood contested the accuracy of that estimate. He noted that it's not clear what the operator would eventually harvest.

Wolfe said that the FRPA should remain a notification system and not a permit system. On other issues we have frequently encountered diverse scientific opinions and have used a Science and Technical Committee to work through that. A similar process could occur for landslide issues. However, this issue is restricted to a unique set of circumstances. Other states have amended their acts, but I don't know how often this situation occurs in Alaska. Most southeast Alaska land is in the Tongass; that's different from California, Washington, and Oregon. The formation of boroughs is another issue at play – we don't know where Petersburg is in this process. Wolfe said that he understands that there is an effort to organize the unorganized borough. That could address something as specific as the Mitkof. It would be possible to amend the title and purpose of the Forest Practices Act to include public safety, but that would have to be very cautiously done. Is the issue just associated with landslides? That may be solvable.

Bosworth stated that he is sympathetic to the public safety concern. It's reasonable that the statute should cover public safety. However, he isn't sure how to get there, and it's a longer term issue than the time frame for the Mitkof issue. It may be a larger issue than Mitkof. If we don't deal with it, it could come back to bite us.

McLarnon stated that she believes this is more appropriate for a local government issue than a statute change at this time.

Cronin suggested that FRPA should defer to Title 29 and common law with respect to negligence for public safety issues. How is this issue addressed when it's not forestry involved? Maisch asked what the local Petersburg government is doing on this issue. Wood replied that he didn't know what the Petersburg Planning and Zoning Commission would do, nor whether harvesters would have to comply; they don't have to comply with DEC or OHMP recommendations under FRPA. Maisch responded that landowners do have to comply with agency recommendations that are based in the Act and regulations, and they are given due deference under FRPA. He added that the Mat-Su Borough passed ordinances on truck traffic, noise, and lighting issues on forestry operations that apply to all lands. Local governments do have powers that apply to private landowners.

Wood commented that the USFS has already said they could never log this hillside, and this could occur in other areas, too. Why does the state sanction this? Maisch replied that FRPA is not a permit system; we enforce compliance with the standards in the Act. Local zoning powers may be a quicker solution than an amendment to the Act.

Wolfe said that there is another issue – the Board has sought to have FRPA provide one-stop-shopping as much as possible, e.g., with respect to Clean Water Act and Coastal Zone Management. If we do turn to

local boroughs to formulate rules for this activity, it lessens the one-stop-shopping role of the Act. We could wind up with multiple rules in multiple boroughs. How frequently do we think this will occur? It is clearly significant for the Mitkof Homeowners.

Maisch asked what effect borough ordinances have on the State? Freeman replied that the Attorney General's office has advised us that the state has to comply unless there is some site-specific overriding state interest. Such a determination would require a specific finding. In general, the state has to comply with local ordinances. We expect operators on state timber sales in the Mat-Su Borough to comply with the Mat-Su ordinances. Maisch reiterated that local ordinance may be a better avenue for the Mitkof homeowners.

Wood stated that he believes this is a state issue. He has watched what's happened in Wrangell. It is unconscionable for the state to have this omission in FRPA, and to have homeowners spend over \$100,000 of their own money to fight this issue.

Dave Beebe added that the Mental Health Trust land holdings are in communities – this is at least a statewide issue. If there is competing science, there could be no better case than Craig Erdman being hired to contest Mr. Swanston's concerns. He was previously found negligent in assessing landslide risk from forest operations in California.

Rogers suggested that we are overlooking the common law. He appreciates that the homeowners don't have the satisfaction of a permanent solution, but the Mental Health Trust is seeking alternatives, they are recognizing that they have some exposure and risk, and don't want to cause harm. It appears that sensible people are trying to find ways to manage this land. This sale is predominantly helicopter volume – less than 10 MBF/ac would be harvested. It's not a massive clearcut. The DPO anticipated modifying the prescription based on the situation. There are other avenues to address this issue.

Curran commented that the main mitigation proposed by the landowner is selective harvesting by helicopter. If the Board proposed a change in the statute, would you need BMPs for mitigation, or would it prohibit harvesting, which raises the question of a taking. If there's not a prohibition, recommended BMPs would likely include no surface yarding, avoid V-notch drainages, no clearcutting, and capping the volume to be harvested. This is what the Mental Health Trust proposes doing on this sale.

Bosworth asked whether the Swanston report considered the operation as proposed. Freeman replied that he did look at the specific actions proposed, but we don't know whether he assumed the helicopter harvesting would be by individual tree selection, which is how this operation would occur, or patch clearcutting which is considered partial harvest under the USFS system.

- ▶ **Wolfe moved that the Board form a technical working group to quantify the extent of public safety risks associated with landslides and forestry operations, and what scientific issues are associated with forestry operations relative to public safety in high-risk areas. Nicolls seconded.**

Nicolls asked whether there is some other appropriate area to address this issue other than FRPA. Maisch said that he wasn't aware of another part of state law; the question would be whether there is a local government option.

Bosworth asked for clarification of the motion. Wolfe said that the work group should first look at land ownership, existing or planned public highways, and an overlay of relief showing steep areas relative to public roads. The focus should be on Region I unless DOF foresters think there are other applicable areas. Bosworth asked whether this would be a risk assessment. Wolfe said not yet -- that would require also looking at soils and other conditions. This would first identify the extent of areas where problems

might exist. Bosworth observed that it sounds expensive. Maisch said that DOF would have to look at options to staff it out. Hanley reported that the USFS already has this information. Maisch said that we'd have to find out how much of the data is available in GIS on non-federal land. Rogers suggested that the problems are most likely focused on Mental Health Trust land because it is around communities.

Bosworth said that it would be good information to have, but the risk to public safety exists whether it's a small number of sites or a large number. Maisch recognized that it's important no matter how many places it occurs. Wolfe clarified that if it occurs on a small number of sites, the solution could be local rather than through state law. If it's a bigger problem it puts it more in the camp of addressing it through a statewide law.

Nicolls stated that whatever the Board does would have to apply to more than Petersburg. Maisch reiterated that if there are only a few communities affected, it could be addressed through local zoning rather than state statute.

DiMarchi said that a risk assessment will be a bigger chore than portrayed – it will include climate and soils data as well as slope and communities. Maisch replied that what is proposed is just the first filter, not a full risk assessment, and would depend on what GIS data is available. DiMarchi asked whether we know enough to make an educated guess now.

Wolfe said that another aspect of the issue is associated with public roads. Maisch suggested that the Alaska Department of Transportation and Public Facilities might have relevant information.

Wood noted that the language that the Mitkof Highway Homeowners Association proposed for addition to FRPA is from a report by the Alaska Division of Geological and Geophysical Surveys.

Rogers commented that if FRPA is inadequate in addressing mass wasting, we should deal with it irrespective of whether it is an issue of public safety. Any BMPs proposed from such a review would likely be similar to what the Mental Health Trust is actually doing – avoid clearcutting, helicopter yard, limit the basal area harvested.

The Board voted on the motion: In favor – Wolfe. Opposed – Cronin, DiMarchi, Bosworth, McLarnon, Rogers, Nicolls.

Bosworth asked whether the Board should introduce a motion to support the language proposed by the Mitkof homeowners. DiMarchi asked how the Board could support the proposal, if they don't support the study proposed by Wolfe. Maisch said that it would require a bigger technical review to determine whether additional BMPs would be needed in areas with public safety risk.

The Board broke for lunch. The discussion was continued later in the day.

FRPA standards re landslides and public safety, continued. Wood said that the second part of the amendment proposed by the Mitkof Homeowners would benefit the Division and put homeowners on notice of hazard issues. Maisch commented that DOF is are working with the Division of Mining, Land, and Water on similar issues with respect to fire hazard in potential land sale areas.

Wood asked, if FRPA is not responsible for all logging practices in Alaska, then who or what is? Maisch replied that FRPA is the authority for the area for which it has oversight – primarily fish habitat and water quality. For example, Mat-Su ordinances address issues not covered by FRPA. There are multiple jurisdictions over some activities.

Wood suggested that DNR could ask the Attorney General whether or not the state has a duty to protect its citizens, and if so, would the proposed amendment fulfill that duty. Rogers commented that that is a policy question, not a legal question. Most public safety issues are dealt with by other entities. Cronin said that the state isn't required to protect people as much as to protect their rights, for example, they can go hang-gliding even though it's a risk. DiMarchi asked Wood, given the limits of authority under FRPA, or even the time to go through the two-year process to develop new best management practices (BMPs) that are likely to be similar to what is already proposed by the Mental Health Trust authority, what could the Board do for you? Wood replied that the Board could support the amendment. It would help others in the state. He said that his land should never have been put up for sale, but it was, and he has been here since 1961. There's room for improvement.

Nicolls commented that it is clear that the Board is sympathetic to the concept, but questions whether FRPA is the place for this authority.

Maisch said that if the Board convenes a panel of experts to develop BMPs for public safety in steep slope conditions, we'd probably wind up with some matrix that got more restrictive as risk increased, but probably wouldn't get to the point of prohibiting harvesting because it could be a taking issue. Rogers also said that the Board hasn't seen science that says removing 20-30% of the basal area with a helicopter and full suspension will significantly increase the risk of slope failure. We have similar operations throughout southeast Alaska, although they don't have homes below them. What has occurred?

Curran reported that helicopter logging on private and other public land has been done through single-tree selection harvesting, not patch cutting. That is different than on federal USFS operations. DOF has no record of slides with selective helicopter logging. Such operations have occurred near residential areas near Ketchikan, Craig, Coffman Cove, and Thorne Bay on moderate to steep slopes. Companies have logged in Bear Valley and Ward Cove and above Wal-Mart in Ketchikan on 50-80% slopes. For BMPs in areas with potential for mass wasting, one consideration would be whether clearcutting and surface yarding would be permitted, with a limit to basal area removal – it is not clear what other BMPs we would come up with short of prohibiting harvesting.

Rogers said that he would be very surprised if the conclusion was different that what experience has taught us in other areas. With helicopter yarding, the duff is intact, just the trees disappear. Road building is the big risk and we have strong BMPs for that.

Curran said that if the state were to have a sale in that area, we would look at the slope, location of houses, streams, and V-notches. We would probably have units exclude areas right above houses or adjacent to V-notch streams, and keep off excessively steep slopes with the helicopter units. We would do this on the basis of the individual sales and site-specific conditions, not a state statute. On state sales, we do have public comment.

Wood commented that the MHT didn't have any discussions on the proposed units. He didn't know of any studies on helicopter units with selective harvesting. The USFS had a slide on 2-3 acre units. Even with single tree removal there will be loss of root strength and more precipitation reaching the ground. If something does happen, the state, landowner, and operator will all be blamed, especially since they've been alerted to the problem. The Oregon experience started on private land. The Oregon Department of Forestry told the company not to harvest in an area above houses. In 1996, the Oregon Governor directed the Department to come up with measures for landslides. Washington State took pre-emptive steps based on the Oregon experience; California did, too, so Alaska is the only west coast state that hasn't addressed this.

Cronin said that the human safety issue is the most important issue – no one wants people hurt or their property destroyed. It's our job with the other entities – the Attorney General's Office, and Mental Health Trust to figure this out for the affected citizens.

Maisch proposed that DOF:

- 1) Find out whether there are any studies on single-tree selection in similar conditions and landslide risk.
- 2) Contact the Mental Health Trust executive director to find out what they've thought about, including whether they have considered the kind of layout considerations Curran described, and find out the status of the land exchange proposal. The Trust is a state agency, but is a private landholder for the purposes under FRPA.
- 3) Take a closer look at Oregon's situation and find out whether the harvest that led to slides was a single-tree selection helicopter operation. Curran reported that the referenced slides were patch cuts from 1.5 to 5 acres. Those are clearcuts, though small. They're removing all the timber within the patch. Alcan proposed single-tree harvest rather than patch cutting.
- 4) Verify the amount of timber proposed for removal and the method of removal.

Maisch said that the Division of Forestry could follow-up on this, see if we can help broker a solution, and report back to the Board at the next meeting. While not wanting to change the Act, we do want to see a resolution to this issue.

Wood said that their goal is to help enact a land exchange with the Trust and the federal government. Swanston said that harvesting would be negligent. Trust land logging, based on the Wrangell operation, isn't very clean. They planned on harvesting 23 MMBF out of the 40 MMBF in these units. If they are going to take every marketable tree, they'll leave the butts and tops. These slopes are way extreme for this. It would be different if no one were living here. Curran said that it would be worthwhile to consider revising the harvest unit design. The original proposal was to yard the logs to existing landings or the proposed road. The whole hillside isn't >67% and some is away from residential areas, and could be harvested without increased risk. The Mitkof Homeowners and Mental Health Trust need to develop solutions together. Wood stated that the majority above the toe of the slope is greater than 67%.

Rogers said that the Board is dealing with second-hand information. If we are going to go down the factual road, we need to hear from everyone. We haven't heard from Alcan or the Mental Health Trust or the scientists who looked at the site. Based on the DPO it looks like a selective operation. Wood said that the DPO said 23 MMBF would be harvested. Another risk analysis by Craig Erdman stated that source of past slides was a road that doesn't exist. The Trust is back in Washington, D.C. working on a land exchange today. Petersburg is just an example, and this proposed amendment is for the state.

Wolfe commented that this discussion sounds like a Board approving a permit. We've talked enough. The chair's proposal to proceed is legitimate. In FRPA, the State Forester has directive authority. The DOF isn't prepared to do detailed unit by unit reviews.

Bosworth asked whether there is a role for the Board. Maisch suggested that it would be more timely at the next meeting when DOF presents the results. It may depend on the status of the proposed land exchange.

Maisch thanked everyone for their time and acknowledged that the Mitkof Homeowners would like a quick answer.

Wood reported that Forrest Cole (USFS) said that the USFS could never harvest this area. Wood said he appreciated the Board giving this much time to this issue. He would like to have DOF take the actions suggested by Maisch.

Cronin agreed with Wolfe that we don't want to get into a permitting role on specific projects especially without visiting the site or having the experience. Common law principles on negligence may already clarify what constitutes negligent action. Maisch commented that a lawsuit following harm is always an option, but we would prefer avoiding harm. He suggested tabling the Mitkof Homeowners proposal until the Board has more information.

Attendees

Dave Beebe, Mitkof Highway Homeowners Association (by phone)
Joe Bovee, Ahtna
Amalie Couvillion, The Nature Conservancy
Mike Curran, DOF
Jim Durst, OHMP
Mark Eliot, DOF-Fairbanks teleconference site
Marty Freeman, DOF

Kevin Hanley, DEC
Kerry Howard, OHMP
Paul Maki, citizen
Joel Nudelman, DOF
Tom Paragi, ADF&G
Nancy Sonafrank, DEC
Ed Wood, Mitkof Highway Homeowners Association (by phone)



MINUTES Board of Forestry Meeting Tuesday-Wednesday, July 8-9, 2008 Haines City Council Chambers

Call to Order and Roll Call. Chairman Maisch called the meeting to order at 3:05 p.m. Fairbanks, Anchorage, and Juneau conference rooms were connected. Board members present were Rob Bosworth, Matthew Cronin (by teleconference from Anchorage), Erin McLarnon, Wayne Nicolls, Bill Oliver, Rick Rogers, and Nathan Soboleff substituting for Ron Wolfe. The Mining seat is vacant – Jack DiMarchi recently took a new job with the DNR Division of Mining, Land, and Water, and a new member has not yet been appointed. A quorum was present.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

Update on FRPA standards re landslides and public safety. Freeman explained that at the February Board meeting, DOF agreed to find out whether there are any studies on single-tree selection harvest by helicopter and landslide risk. None are known at this time – while some studies analyzed helicopter harvests, all were on clearcutting operations. DOF is reviewing reports from the USFS Alternatives to Clearcut study to determine whether any of that has relevant information on landslide risk associated with selective cutting with helicopter yarding.

DOF also agreed to contact the Mental Health Trust executive director to find out the status of the land exchange proposal. The Trust is continuing to pursue the exchange with the USFS and is optimistic about its chances of success.

DOF also reviewed the Oregon situation. The Oregon slides originated from small clearcuts of 1.5 to 5 acres in which all the timber within the patch was removed. The operation proposed on the Trust property was for single-tree harvest rather than patch cutting. DOF confirmed that the DPO for the Trust proposal covered 23 MMBF of timber. It included 200 acres of conventional logging in five units, and 567 acres of helicopter harvesting. DOF and OHMP inspected the proposed harvest area. Under FRPA regulations with helicopter logging and single-tree selection, it did not raise agency concerns. The

original DPO was received on June 13, 2006 – a renewal notice would be required before the Trust could proceed with the proposal if there is no change; a Change in Operations or new DPO would be needed a change is proposed. .

After considering existing FRPA standards, DOF prepared a white paper (see handout), that recommends that the Board convene a Science & Technical committee to review the current mass wasting standards, and if appropriate, draft language for presentation to the Board of Forestry. The committee should consider the following items:

- Including public safety in the factors to consider for preventing or minimizing adverse impacts of mass wasting. This would require a statutory change.
- Defining the following terms and providing guidance for determining where these conditions exist:
 - “unstable or slide-prone slope”,
 - “slope that has a high risk of slope failure”
 - “fill material prone to mass wasting”.This would require a regulatory change.
- Providing guidance for determining where a public safety risk exists, e.g., combination of unstable slopes and human occupancy/use in a potential slide path. This would require a regulatory change.
- Developing additional BMP(s) for harvesting and yarding methods in unstable or slide-prone areas. This would be a regulatory change.

DOF does not recommend adding language on location of structures to FRPA – FRPA applies only to commercial forestry operations.

Oliver moved that the Board adopt the recommendations of the Division to convene a study group. Public safety is an important issue. If FRPA doesn't address it, perhaps it should. There is a standard for mass wasting, but it doesn't apply to safety. Definitions need to be refined to implement the Act. It's a necessary step. Bosworth seconded the motion.

Wolfe said that the FRPA and BOF process commonly convenes a Science and Technical Committee, and these committees sometimes deal with science and policy issues, or just science. Does this proposal follow prior procedures? Freeman said yes – the Science and Technical Committee would report to the Board. If the Board endorses their recommendations, the next step would be to convene an Implementation Group to figure out how to implement the recommendations in a manner that is practical on the ground. The Implementation Group recommendations would again be reviewed by the Board before proceeding with any statutory or regulatory process. Oliver stated that it is not our intent to prevent any landslide happening anywhere, but considerations with respect to landslides should include public safety.

Wolfe commented that there is a science role in this, but it will run up against the policy role at some point. If we have to open up the Act in the legislature, we may not have control over what is addressed. The Board needs to track that this is where the process could go. The Board in the past has always operated through a unified position that the Legislature respected. There is no guarantee that the legislature would respect it in the future. Oliver agreed with that approach.

McLarnon noted that the Board agreed at the February 2008 meeting that FRPA should remain a notice system and not a permit. Did that previous vote cover this same proposal? Wolfe replied that as the sponsor of the prior motion, he was contemplating a narrower, different approach.

Wolfe said that he remains concerned about the scope of this problem. The Science committee should include an assessment of the scope of the problem in their mission. Maisch agreed that would help focus the work on the actual risks. Rogers shares that concern and wants to give the Science & Technical Committee (S&TC) clear marching orders, and not allow it to drift into policy issues. The first bullet –

including public safety in factors to consider -- is a policy issue. That should be eliminated from the S&TC charge. The other three bullets will give the Board better info to make the policy call. Wolfe suggested that rather than deleting the first bullet, the Board should ask the S&TC to list operational factors to consider. Rogers said that is captured in the fourth bullet on recommendations for operational best management practices (BMPs). Maisch agreed that the first bullet is more an implementation discussion than science.

Bosworth said he is puzzled by the proposed separation of policy and science. The Board covers both, and S&TC members would be largely Board members. Maisch clarified that S&TC members are typically people outside the Board with required scientific and technical expertise. The S&TC would report to the Board, but not be made up of Board members. The Board usually convenes a separate implementation group of interest groups and implementers to work with the science recommendations and develop a consensus on how to translate them into statutes or regulations. Freeman added that state agency representatives are usually on both the S&TC and the Implementation Group, and help provide continuity in the process.

Oliver agreed to include an amendment to delete the first bullet from the motion. Cronin agreed with the separation of science and policy. Public safety is a policy issue and will be specific to location. He would like the S&TC to compile a technical report that defines the terms and gives a synopsis of the conditions under which mass wasting has occurred in southeast and southcentral Alaska. Once we know the frequency and nature of the events, we can look at them from a forestry perspective. First we need to understand the science; how it's applied is a separate enterprise. He recommended expanding bullet two to synthesize what we know about where landslides have occurred in the past in Alaska. Oliver asked whether bullet three incorporates Cronin's concerns. Cronin noted that landslide risks may have been covered in Tongass EISs – they would be a good starting point for review of information.

Rogers observed that this isn't really a fishery issue, and asked whether the S&TC needs both a fish biologist and a Habitat Division representative. Maisch said that DOF will assemble a team to look at this, and vet potential names. Rogers said he doesn't want to see mission creep. If Habitat Division representatives have fish biology expertise, that's fine. Freeman said she wants to be sure that if there are BMP recommendations, we should be sure they don't inadvertently affect fish habitat. If the Habitat Division representative has fisheries expertise, that could cover the concern. Oliver commented that this group will develop definitions that will also affect fish habitat. Rogers concurred. Curran said that for field implementation the definitions are nebulous. Whether it's for water quality and fish habitat or public safety, better definitions are needed for use by people in the field. We do have water quality and fish habitat BMPs, but if we change the definitions it could affect the BMPs. For example, there are no parameters for mass wasting. Cronin said that a definition of slope failure and mass wasting is also needed.

Wolfe clarified that the issue with fish biology is ensuring consistency, not broadening the mission to address fish biology issues. Oliver said that providing definitions may expand the mission, but we need them.

Wolfe asked for clarification on "providing guidance on where a public safety risk exists." Oliver said he expects a list of where public safety events have occurred and under what conditions. For example, there was a 1990 slide in Kodiak after a 10" rainfall. Maisch said the S&TC would identify what kinds of public safety risks exist – e.g., residential areas, utility corridors, public highways – what is the relative risk?

Oliver said that the clear intent is to gather scientific information, not policy recommendations. Rogers stated that the Board has a good handle on the motion. Freeman could circulate a more detailed charter for the group by e-mail.

Cronin suggested that the way to do this is to have the scientists give an appraisal of the geological and hydrological conditions where slides occur. That's different than "What's a landslide going to do to a bridge?" Take the appropriate scientists (soil, hydrology, geology) to assess the physical conditions, then ask what a slide would do to a bridge or fish stream. Add a specific bullet to the motion to review the science and past occurrences of these events.

Ed Wood, MHHA, Petersburg homeowner, complimented DOF on the white paper. The first and third bullets are the core of the exercise, and give direction to the S&TC for their analysis. There is a science and policy issue, and he appreciates the Board's efforts.

McLarnon commented that the same scientists Cronin listed would define slide-prone slope, etc. Maisch said that the committee can explore relevant questions unearthed during discussions. McLarnon added that they can also identify items they aren't qualified to cover. Maisch agreed that's how the process works. He served on a S&TC when he worked for Tanana Chiefs Conference. The core group stayed the same, but other experts were brought in as needed. Oliver emphasized that there's no intent to change the way DOF has run these processes, and it has been successful. Maisch and Freeman will keep the committee on task.

Cronin suggested adding more on a review of existing science rather than defining terms. A first bullet was added to the motion to address this.

The motion passed unanimously to convene a study group with the following charge:

- Review and synthesize existing information on landslide occurrence in Alaskan forests.
- Define the following terms and provide guidance for determining where these conditions exist:
 - "unstable or slide-prone slope",
 - "slope that has a high risk of slope failure"
 - "fill material prone to mass wasting".This would require a regulatory change.
- Provide guidance for determining where a public safety risk exists, e.g., combination of unstable slopes and human occupancy/use in potential slide path. This would require a regulatory change.
- Develop additional BMP(s) for harvesting and yarding methods in unstable or slide-prone areas. This would be a regulatory change.

Attendance

Clarence Clark, DOF

Mike Curran, DOF

Mark Eliot, DOF

Kevin Hanley, DEC

Kerry Howard, ADF&G Habitat,
(teleconference from Anchorage)

Roy Josephson, DOF

Kyle Moselle, ADF&G Habitat

Nancy Sonafrank, DEC (teleconference from
Anchorage)

Cindy Gilder, DEC (teleconference from
Anchorage)

George Woodbury

Ed Wood, MHHA (teleconference, Petersburg)

Dave Beebe (teleconference, Petersburg)



MINUTES
Board of Forestry Meeting
Wednesday, November 12, 2008
Division of Forestry Palmer Office

Call to Order and Roll Call. Chairman Maisch called the meeting to order at 8:24 a.m. Fairbanks and Juneau conference rooms were connected. Board members present were Rob Bosworth (by teleconference from Juneau), Matthew Cronin (by teleconference from Anchorage), Erin McLarnon, Wayne Nicolls, Rick Rogers, and Ron Wolfe. Jeff Foley was absent due to a death in the family. The Commercial Fishing seat is vacant – Bill Oliver resigned in July, and a new member has not yet been appointed. There was not a quorum.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

Update on FRPA standards re landslides and public safety. Marty Freeman, DOF reported that she is working on identifying potential candidates for the Landslide Science & Technical Committee (S&TC). The FRPA agency representatives will be Kevin Hanley for DEC, Jim Cariello for ADF&G, and a combination of Clarence Clark, Greg Staunton, or Pat Palkovic for DOF. The ADF&G representative will also provide the S&TC expertise on fish biology if questions arise on impacts of committee recommendations relative to fish protection under FRPA. The DOF representative(s) will provide expertise on timber sale planning.

Freeman is contacting knowledgeable people in the public and private sectors to identify and review potential candidates with expertise in hydrology, geology, soil science, and logging engineering to participate. At this point, the list of possibilities is still growing; the next step is to whittle it down. The goal is to have the committee identified by early December, and start work prior to the next Board meeting.

Prior to convening the S&TC, Freeman will work with agencies and landowners to identify existing data that can be used to identify the geographic scope of the issue. The hope is that we can work with landowners and agencies to screen areas for potential hazards based on public use, geology, and commercial forests. Sealaska has already agreed to share data for their lands. The initial screening would be a draft provided to the S&TC to help focus and frame issues.

Nicolls asked whether there is a chance that Doug Swanston would be available. Freeman replied that she has talked to him, and that he has been very helpful with candidate recommendations, and expressed interest in the Committee.

Wolfe asked whether the screening of potentially affected land could be done by the next BOF meeting. Freeman replied that that is the target, but recognized that there are other issues that could slow things down.

Ed Wood (on teleconference) commented that he wants the committee to provide maximum protection to public in hazard areas, and have the BMPs recognize public rights to protection. He appreciates Marty's efforts and thanked the Board for moving forward on this. Maisch said that progress has been slower than we'd like, but DOF hasn't set this aside.

Attendance
Clarence Clark, DOF

Mike Curran, DOF (teleconference from Ketchikan)
Mark Eliot, DOF (teleconference from Fairbanks)
Marty Freeman, DOF
Cindy Gilder, DEC
Kevin Hanley, DEC
Glen Holt, DOF
Rick Jandreau, DOF
Bob Jones, NRCS

Glenn Juday, UAF
Mac McLean, ADF&G Habitat (teleconference from Fairbanks)
Joel Nudelman, DOF (teleconference from Juneau)
Dan Parrent, JEDC
Jim Schwarber, DOF
Shawn Stokes, DEC
Ed Wood, MHHA (teleconference, Petersburg)



MINUTES
Board of Forestry Meeting
Wednesday-Thursday, March 18-19, 2009
DNR Office, Fairbanks – Large Conference Room

Call to Order and Roll Call. Chairman Maisch called the meeting to order at 1:14 p.m. Anchorage and Juneau conference rooms were connected. Board members present were Rob Bosworth (by teleconference from Juneau), Matthew Cronin (by teleconference from Anchorage), Jeff Foley, Erin McLarnon, Wayne Nicolls, Rick Rogers, Mark Vinsel, and Ron Wolfe. All Board seats are now filled, and a quorum was present.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

Update on FRPA standards re landslides and public safety. Freeman reported that the Landslide Science & Technical Committee (S&TC) met for the first time on February 10, 2009. Minutes are in the Board packet. Freeman apologized for a delay in getting the minutes to the public – there was a mix-up among multiple mailouts. The main focus of the meeting was to start assessing the geographic scope of the potential public safety risks associated with forest operations. The committee reviewed a first draft of a model developed by Hans Buchholdt, DOF GIS specialist, based on slope, land ownership, forest cover, known landslides, and publicly used roads. The committee had both site-specific and general recommendations for upgrading the model. DOF is in the process of incorporating those recommendations into a second version of the model, and committee members are working on follow-up tasks.

Dennis Landwehr, USFS soil scientist on the S&TC, has reviewed data from 175 known landslides to determine whether the half-mile distance used to identify potential runout zones was reasonable. He reported that only three slides were >2,000 feet long, and only one of those was >1/2-mile.

During the discussions, the committee noted that the high risk period is seasonal, associated with heavy fall rains or winter rain-on-snow events. Discussion will continue on how to incorporate seasonality into the risk assessment, since some areas only receive significant public use during summer. There was also initial discussion, that at some sites, there may be an option to control public access to reduce risk, rather than further restricting harvest practices.

There are two draft consensus points from the committee regarding the scoping process:

Consensus point 1. These maps are a tool for assessing the general scope of landslide hazards and public safety risks associated with forest operations. They do not replace the need for site-specific analysis and design of timber sales and access roads.

Consensus point 2. The location of public safety risks will change over time as patterns of public use, public road access, and timber harvesting change.

The committee asked for clarification on the Board's intent for addressing public safety – in particular, is it limited to risks to people and residences, or does it include damage to infrastructure, such as utility transmission lines. Our initial assumption is that the focus is on areas of human use, but we appreciate input from the Board.

The committee will meet again on April 1, to continue the scoping process, and discuss definitions for key terms.

Freeman showed PowerPoint slides of the draft risk maps, along with notes on recommended changes from the committee.

Wolfe asked about a comment in the minutes that a ½-mile runout distance is not enough. Freeman explained that Dennis Landwehr's review of specific landslide data occurred after the meeting.

Ed Wood from the Mitkof Highway Homeowners Association asked whether lands could be added to the timber base in the future. Freeman said that lands could be added, but that recommendations on best management practices are not tied to the scoping maps, but to site-specific conditions. Even if lands are not on the scoping map, BMPs would apply if the local conditions required it. Wood stated that the Homeowners Association would be willing to petition the legislature and governor for additional FRPA funding if needed. Maisch said that the agencies are OK for FY10, but Wood may hear more from them next year.

Wolfe asked about the expansion of slope categories in the scoping assessment to include a 50-66% category -- is the committee staying focused on the FRPA questions, or getting into side issues. Freeman replied that it is her job to keep the committee focused. She added that they have only had one meeting so far, and made significant progress on the scoping task. She expects the scoping phase will be concluded in one to two more meetings. If the Board then judges that they don't want to proceed with BMP review, they can make that decision. Wolfe concurred that the committee has made progress in a short time.

Rogers said that the committee has made good progress, and appreciate the depth of local knowledge they bring to the process. He was glad the committee work was framed in context of FRPA issues at the first meeting, and is interested to see where they get at the next meeting.

The Board discussed the question of whether public safety issues should include risks to infrastructure. Rogers said that it probably does not include infrastructure; if it did, all public roads themselves would be infrastructure. Vinsel commented that as Alaska tries to get off diesel and move forward with interties, protection of power lines is important. Energy supply affects communities' prospects for economic success. Freeman noted that in the S&TC discussion, a member commented that landslide risks to infrastructure are assessed in project design. Wolfe concurred with Rogers – power lines are important, but covering public safety risks would require a legislative change and we want to keep the process focused, not addressing repeater sites, utility lines, etc. which should be addressed in project review. Maisch summarized the Board's opinion that the focus for the S&TC is on public safety rather than infrastructure.

Attendance

Matt Anderson, BLM Forester
Tom Brookover, ADF&G Sport Fish Region V
(teleconference from Anchorage)
Clarence Clark, DOF
Mike Curran, DOF (by teleconference from
Ketchikan)
Mark Eliot, DOF
Marty Freeman, DOF
Cindy Gilder, DEC
Kevin Hanley, DEC (teleconference from
Juneau)

Kerry Howard, ADF&G Habitat
Paul Maki
Doug Martin, Martin Environmental
Mac McLean, ADF&G Habitat (teleconference
from Fairbanks)
Joel Nudelman, DOF (teleconference from
Juneau)
Jim Schwarber, DOF
Ed Wood, MHHA (teleconference, Petersburg)
Kyle Moselle, ADF&G HB



Board of Forestry Meeting Tuesday-Thursday, August 11-13, 2009 Craig Community Center, Craig, Alaska

Wednesday, August 12

The field trip continued from 8:15 a.m. to 12:15 p.m. with stops to see landslide areas along the Port St. Nicholas road, tour the Viking Lumber Company mill, and tour the Craig District Heating Project.

Introduction

Call to Order and Roll Call. Chairman Maisch called the meeting to order at 1:15 p.m. Anchorage, Juneau, and Fairbanks teleconference rooms were connected. Board members present were Rob Bosworth, Jeff Foley, Erin McLarnon, Paul Maki, retired forester substituting for Wayne Nicolls, Mark Vinsel, and Ron Wolfe, and Owen Graham, executive director of the Alaska Forest Association, substituting for Rick Rogers. Matthew Cronin was absent. A quorum was present.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

Update on FRPA standards re landslides and public safety. Freeman updated the Board on the work of the Landslide Science & Technical Committee (S&TC) through handouts and a powerpoint presentation (S&TC) (*see multiple handouts*). The S&TC completed its Phase 1 work, including compilation of a bibliography, definitions for key terms, a model for assessing the geographic extent of potential landslide hazards associated with timber operations, and maps of potential hazard areas.

The committee emphasized that the hazard area maps are for scoping – they don't replace the need for site-specific analyses, but just identify areas that merit a closer look on the ground. Also, they only identify potential hazard areas related to forest operations – other hazard areas exist that are unrelated to forestry.

Of the 29.4 million acres reviewed, about 5.6 million acres had commercial forests that were available for harvesting (i.e., harvesting was not officially prohibited). Of the 5.6 million acres, about 301,000 acres are within one-half mile of a public road, and of that area about 55,000 acres were mapped as potential hazard areas. The hazard area averaged about 0.5 to 1.8% of each landowner type's total area available for harvest, and about 15-20% of the available harvest area within one-half mile of public roads. Freeman

reviewed orthophotos with Ketchikan staff to identify which hazard areas had residential areas or structures, and only a small subset of the total harvest area has any kind of structure.

The Board needs to decide whether to direct the S&TC to continue with Phase 2 – review of BMPs and recommendations of any necessary additions or changes to address public safety. If Phase 2 continues, an Implementation Group representing stakeholders would review S&TC recommendations, determine how to implement them in a practical manner, and draft any needed changes to FRPA or its regulations.

Wolfe said that this was a good report for Phase 1. He asked whether there is an opportunity for landowners to participate in truthing the scoping model, and spoke to concerns for any follow-up actions. For Phase 2 the process should be similar to 1989, which had a science and technical committee and an administrative policy group. This setting is narrower. He is concerned that S&TC is getting ahead of policy issues. The 50-67% slope category flies in the face of previous work. For the question of where we go from here, the S&TC isn't always the best suited. Another group may be needed.

Wolfe said he is fascinated that we analyzed TNF lands. FRPA does not apply to federal land. Freeman noted that through ACMP, federal agencies must meet or exceed the standards in FRPA. Wolfe suggested that the Tongass National Forest supervisor should be involved. In the Sealaska region there are six village corporations that would be impacted as well as Sealaska.

Wolfe noted that on the field tour the Board discussed landslide hazards. A house at the end of an avalanche chute is different than a highway – people are present more of the time. There is a land use factor as well as policy factor that will require a dynamic between the implementation and S&TC group.

Vinsel asked who is on the implementation group. Maisch explained that a group has not been established yet. Freeman clarified that the Board asked the S&TC to complete scoping before the Board decides whether or not to proceed. Foley said that some additional technical work may be needed to better characterize the risk.

McLarnon asked whether mapped hazard areas are just roads, or roads and people. She would like to see residential areas mapped in a separate color. Freeman estimated that only about 15-20% of the hazard areas adjacent to public roads also have structures. Wolfe would like the S&TC to quantify that factor. Moselle, who is on the S&TC, reminded the Board of the caveats in the S&TC consensus points. One of the caveats recognizes that land use will change over time. This is a snapshot, not just of roads but also where houses are likely to be built.

Moselle also emphasized that the S&TC didn't pull the 50% slope break from the air, but from reports that show initiation zones in this range. The scoping maps match occurrences of known slides better after adding the 50% category. Hanley, who is also on the S&TC, agreed, and added that the slope data is not just from British Columbia and other outside areas, but also from local USFS work. Freeman reiterated that these are scoping maps. The S&TC added the 50% category because the maps didn't match well with known slides until that category was added.

Wolfe wants to reference the other principles used in developing the 1990 FRPA. You need a different group for the balance of the issues to address the principles.

Graham commented that many factors affect whether slopes will slide, not just slope. He has worked with most of the landowners and road builders, and it's not to any one's advantage to create slides. He is cautious about adopting one-size-fits-all BMPs. Most lands will slide with or without forestry activity. New BMPs would just put another layer of regulation on the industry. Most landowners are already dealing with this issue.

McLarnon observed that at a prior meeting the Board seemed to generally feel that public safety is not part of FRPA. She is not sure whether the extent of the hazards merits a drastic change. Wolfe agreed. This is a significant policy issue. The Act and its purposes would have to be amended to do this. The scoping is a pretty straightforward scientific analysis. These will be hazard areas with or without forestry. We are talking about FRPA.

Foley said he sees a need for further classifying and identifying areas with high risk based on proximity to structures as well as just public roads, then identifying what additional factors are there, and what controls would be appropriate.

McLarnon commented on hearing Pat Palkovic talk about how DOF addresses landslide hazards when reviewing sales. It isn't all written in stone, but agency staff recognize potential hazards.

Representative Peggy Wilson spoke on teleconference. She said that valid concerns have been brought up. It would be good to go further into this. As policy makers, our constitution says we have to think about safety and the welfare of citizens. The livelihood of many people is involved in the timber industry, but safety important, too.

Maisch said that the S&TC had done a great job of scoping. The Board is concerned about whether additional science is needed, especially analysis of the type of risk. It is almost a zoning issue rather than timber harvest issue. He discussed what an implementation group might look like.

Maisch noted that the original Act was based on shared risk and reward. Wolfe replied that the shared risk principle is more logical and specifically applicable in the context of issues of the day for the original act. He is not sure that it applies to a public safety issue. That may be appropriate for an implementation group or other process than FRPA. Maisch commented that an implementation group could make recommendations to other entities, not just FRPA.

Freeman reviewed AS 41.17.060(b)(5) and the white paper that DOF prepared early in the discussion of whether to address public safety issues. DOF felt there was broad authority under AS 41.17.060(b)(5) to require practices like partial harvesting and no ground disturbance in areas identified as prone to mass wasting. However, the BMPs do not identify tools that could be used. BMPs could identify practices that could be applied in unstable areas identified on the ground without prescribing them. Graham commented that there's a lot of knowledge about techniques to use, but there is also personnel turnover and new people with less experience. Doing a detailed analysis of 30 million acres would be too big an undertaking. It is better to work on training people who are locating and constructing roads. The USFS and others have lots of experts to help with the training.

Wolfe asked whether BMPs would be in the form of a field manual or regulations. Freeman replied that they could be either. The point would be to identify what tools are available and clarify that we have the authority to require them when merited on the ground. Maisch noted that the regulations have little guidance on helicopter operations.

Ed Wood from the Mitkof Highway Homeowners Association commented by teleconference. He appreciated Rep. Wilson's interest in the homeowners' concern. He said there's hardly anyone who supports the timber industry more than Rep. Wilson. He listened to the report on the percent of property affected for Sealaska, and said that 100% of his own property is affected by landslide hazard. Wood said he values his land as much or more than a landowner focused just on timber. As a homeowner, he believes FRPA applies to these issues. If it's not handled through the Board, it may be handled by the legislature or the judiciary. The S&TC has done a good job, and he hopes the process moves forward.

Graham stated that a training program for people designing logging systems or roads is more important than adding BMPs or amending the FRPA. Slides occur with or without forestry activity.

Bosworth suggested that it would help to have a list of potential administrative and policy mechanisms. I don't have all the options in mind with the implications.

Vinsel said that the S&TC seems equipped to narrow down where structures exist, where level of risk is higher. It's our responsibility to protect the welfare of people in harm's way. Other work is needed to identify potential BMPs or a "toolbox". The third part is the public policy of where tools should be prescribed – that might fall to the BOF or legislature. Structure locations can be identified.

Maisch asked whether structure data is out there. Freeman said that there is already a pretty good map. She worked with staff in the Ketchikan area office to use census orthophotos to check mapped hazard areas for structures, and those areas were on the powerpoint slides, they are just not on the printed maps yet.

Wolfe recommended changing the "Implementation Group" to and "Administrative Group." There may be other non-FRPA approaches to this issue. The Administrative Group could also identify other S&TC information that might be needed. Wolfe moved and McLarnon seconded,

- ▶ **That the Board form a committee charged with identifying a menu of options both within and outside FRPA, recognizing past processes and principles used in developing the FRPA, identifying additional data needs, and recommending options to the Board.**

Ron said that the list in the powerpoint of potential Implementation Group members is a good beginning for membership on this group. DOF should talk with the USFS – their participation may or may not be helpful because they have their own process requirements. Freeman noted that they might have problems participating in an implementation group because of Federal Advisory Committee Act (FACA) requirements, and Wolfe concurred.

Wolfe stated that local governments, landowners, homeowners, DOF, and Sealaska should be involved. Maki recommended including the DNR Division of Mining, Land, and Water who do land disposal planning – they put a lot of public land in private ownership. Maisch commented that being aware of future as well as current residential areas is important, and working to avoid increasing problems.

Maisch said that the new group would include stakeholders and identify additional data needs. Vinsel said that he didn't necessarily want to alert insurance companies, but there are questions about how they deal with statistics. They shouldn't necessarily be on there, but it might be interesting to know how they assess risks. Wolfe suggested going to an actuary rather than insurance company for that information. Maisch observed that there has been a parallel in fire hazard history – insurance are now proactively involved in rating risk. In some places they are not insuring homeowners when the risk is too high or requiring mitigation, e.g., through Firewise, before providing insurance. Freeman suggested that the state Division of Risk Management might be another source of information.

Wood reported that there is no landslide insurance available– it's under flood insurance. After the Mental Health Trust logging plan for Mitkof Island came out, companies refused to insure anyone under that provision. They will give flood insurance above mean high water levels, but not after the logging plan was issued.

- ▶ **The motion passed unanimously.**

Maisch and Freeman thanked the S&TC for their work. Hanley also gave kudos to Freeman for her organizational skills.

Vinsel asked Wood whether the insurance company asked the homeowners if there were any special practices applied to the proposed harvest. Wood said no, and said he will send a copy of the insurance company's letter to Freeman.

Attendance

Jason Anderson, TNF Thorne Bay District
Ranger
Susan Baxter, citizen
Peter Bangs, ADF&G, speaker
Shawn Carey, US Fish & Wildlife Service (field
trip)
Clarence Clark, DOF, speaker
Bob Claus, Southeast Alaska Conservation
Coalition
Mark Eliot, DOF, speaker (by teleconference)
Marty Freeman, DOF, speaker
Cindy Gilder, DEC, speaker

Kevin Hanley, DEC
Joe Hitselberger, ADF&G
Kyle Moselle, ADF&G, speaker
Tricia O'Connor, USFS, speaker (by
teleconference)
Jim Schwarber, DOF, speaker
Dave Sturdevant, speaker
Rep. Peggy Wilson, State Representative (by
teleconference)
Ed Wood, Mitkof Highway Homeowners
Association (by teleconference)
George Woodbury, Soil & Water Conservation
Board, speaker



MINUTES
Board of Forestry Meeting
Wednesday-Thursday, October 7-8, 2009
Anchorage, Alaska

Wednesday, October 7

Call to Order and Roll Call. Chairman Maisch called the meeting to order at 11:00 a.m. Juneau and Fairbanks teleconference rooms were connected. Board members present were Rob Bosworth, Jeff Foley, Erin McLarnon, Matt Cronin, Wayne Nicolls, Mark Vinsel, Ron Wolfe, and Eric Nichols.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

FRPA standards re landslides and public safety. Marty Freeman, DOF, presented a PowerPoint update on the Landslide Science & Technical Committee (S&TC) process (*see handout*

Nichols said that developing maps showing potential hazard areas may impact homeowners – insurance companies may refuse to insure homes in mapped hazard areas, or banks may not issue loans for homes in those areas. Wolfe noted that so far the S&TC has been clear that this is a scoping process; where it goes from here we don't go. Maisch commented that the Community Wildfire Protection Plan process has similar issues – insurance companies have contacted homeowners in fire risk areas to require that they use Firewise procedures to reduce risks before they will issue insurance. Wolfe said that Nichols concern is valid, but it's outside FRPA. In the Ketchikan Gateway Borough and other areas there is local zoning. FRPA addresses only fish habitat and water quality currently.

Nichols noted that there are additional private parcels in the Ketchikan area, including private land owned by Alcan. Freeman noted that it isn't possible to directly contact all individual private owners, but she is glad to add anyone to the mail list.

Nichols asked about the percentage of landslides that occur in logged and unlogged areas, and whether the impact is less from slides in harvested areas. Freeman replied that reports by Doug Swanston showed on average an increase in the number of slides associated with forest operations, but a decrease in the proportion of slides that reached streams.

Adjourn Day 1: 5:37 p.m.

Thursday, October 8

Landslides, cont. Paul Slenkamp, Mental Health Trust Land Office handed out and read a letter (*see handout*). FRPA takes into account economics under AS 41.17.010 and .060 and may adopt regulations to accomplish purposes of the Act, but shall avoid regulations that increase operating costs without sign benefits to pub resources (AS 41.17.080). The Trust has been responsive to homeowner concerns; the delay in harvest has cost the Trust millions of dollars. This has been a Trust Land Office decision, not a Board decision. The Trust missed harvesting at the market peak. They also sought alternatives to harvesting in the Petersburg area. The Trust Land Office's mission is to maximize long-term revenue from Trust land. The Trust's concern with the landslide hazards scoping process is the potential negative monetary impact on timber resources.

- The Trust Land Office is working toward a land exchange with the USFS and will issue a formal proposal this month. Many potential exchange lands are designated as hazard areas. There is no imminent danger of those lands being logged. Board movement on this issue could affect the viability of the exchange by diminishing the land value. The Trust requests that the Board delay any hazard designation while they are pursuing the land exchange.
- FRPA Regulations adequately prevent damage from landslides. Risky sites need site-specific examination. Risks can be mitigated through the FRPA regulations and other laws.
- Further site-specific analysis should have occurred before distributing the S&TC hazard modeling maps, and the maps should be marked as scoping maps, not designated areas. Refrain from adopting the maps before additional work completed.

The Trust recognizes that these are scoping maps, but harm has already started to occur. The Mitkof Highway Homeowners Association is already referring to these as "identified areas".

Cronin thanked Slenkamp for the letter, especially the last paragraph. Waiting for site-specific appraisal is what is needed. The Board should consider retitling the maps "scoping areas" rather than "hazard areas" or list the characteristics examined, e.g., slope, etc. Name the effort what it is. Freeman concurred and said that the map labels will be changed.

Bosworth – agree that problems can be avoided with having the right legend on a map. What is the Trust's position on how risks can be mitigated? Slenkamp – 11 AAC 95.290 directs operations to avoid locating roads on unstable slopes, slide-prone areas, and >67% slopes, or to mitigate hazards. You cannot bury materials, organics, excavate or blast when soils are saturated, and must treat unstable slopes with erosion controls, such as end-hauling. These are minimum standards and responsible owners exceed these to minimize liability. Just because public safety is not addressed in FRPA it doesn't reduce the landowner's liability. The Trust is not opposed to exploring the issue.

Bosworth asked about BMPs. Slenkamp said that the Trust uses BMPs quite a bit, e.g., in Ketchikan area helicopter logging and selective cuts. There has been no sign of slides in these areas, none that affected the public. The vast majority of areas shown on maps near populated areas have already been logged –

that's logical because they are near access. Wolfe agreed. Slenkamp noted that the Board hasn't had more than one public safety issue brought before it throughout its history.

Ed Wood, Mitkof Highway Homeowners Association (MHHA) said that this is the first time he has heard from the Trust in 18 months. He said that Harry Noah (Trust) told him it didn't make good business sense to log their Mitkof parcel. The market has collapsed, and Wood hopes it comes back – the Trust has lost a lot of revenue. Wood said that the information in the scoping maps existed before – there was a landslide hazard soil map in Petersburg in hand in 2005. The Trust also has a hazard map for the Petersburg area from Swanston. Board members have that, too (June 2006). The maps confirm what happened a couple of weeks ago on the Mitkof Highway. Wood talked to Swanston last night. He told him that disturbance of naturally unstable ground will increase the frequency of slides.

There appears to be more Board concern about muddy water than bloody water. There is more concern for owners with a million acres than small landowners who could lose their whole parcel and home. Wood understands that the Trust needs to monetize its assets for its beneficiaries. If the Board doesn't include an amendment to FRPA which controls all harvest activities, especially on private, municipal, and state land, it could leave state foresters on a limb twisting in the wind. Two state foresters in Ketchikan knew there were public safety concerns in Petersburg but never investigated it because there was no requirement in FRPA. For liability of state personnel FRPA needs to be amended. The MHHA met with the Petersburg mayor and USFS Supervisor Forrest Cole and a USFS hydrologist to discuss the Trust parcel in August, 2007. Cole made the first move toward a land exchange – he knows what the liabilities of this hillside are and he was willing to accept this property. He said the USFS couldn't log the hillside under their current timber plan. Risks on this property are well-documented and the land and homes will not go away; Wood hopes the exchange doesn't go away either. The exchange proposal has grown so that it may not be acceptable to people now. This parcel is a liability to the Trust. The MHHA has encouraged this exchange and offered support to make it happen for this 2,600 acres. They have complete political support to enact this exchange.

Wood said that the S&TC has done an outstanding job of mapping that confirms the original USFS mapping and Swanston's efforts in the Petersburg area. He appreciated the opportunity to speak.

Nichols said he had not been on the ground at the Mitkof site. In previous Board packets didn't see Swanston's write-up in packet. You said the severity and amount of slides would be greater. Freeman said slides tend to increase, but severity decreases. Wood he talked to Swanston last night. Nichols asked whether he is saying slides will occur with or without harvesting. Wood said yes, but with harvesting there will be more of them. Nichols asked whether Swanston said anything about the amount of wood that comes down after harvesting. Wood reported that Swanston said there's a lot of debris left after helicopter harvesting, so there will likely be more large woody debris coming down.

Nichols stated that some creeks would be more susceptible than others. Was there discussion of just limiting harvest in those areas? Wood said that there wasn't originally, and that after two risk analyses the DPO came out with an increase in volume. After Harry Noah took over at the Trust, he said maybe they could log some but not all of the area, but provided no specifics. One of the latest slides was north of Taain Cr., which was a dividing line before, but is less steep and it became active. Swanston's analysis was that this area was an unacceptable risk.

Curran reported that DOF knows of no studies on just selective harvests; the literature is all on sites with clearcuts or large patch cuts.

Vinsel whether it is clear that if the land swap went through the Mitkof parcel wouldn't be logged. Wood repeated that Forrest Cole said that he could not log it under the current forest plan. Every USFS employee in town said the same thing because of the liability with the homes below. Vinsel asked

whether it is the Trust's intent is to trade the parcel. Slenkamp said yes. He added that this is not the only area with land reconstituted to the trust where this situation occurs. The Trust owns 7,000 to 10,000 acres near communities on steep hillsides, that's why the land exchange proposal has expanded. The Trust doesn't want to be a bad neighbor to provide revenue – it's a difficult position. Vinsel noted that the absence of logging doesn't eliminate the risk of slides. As Newton said, things will come down with or without logging. No matter what the Board does, Wood still has a risk. Wood said he understands that, but we don't want to increase the risk.

Curran said that when the Mat-Su Borough addressed forest operation issues outside FRPA, DOF simply told the Borough that we don't have the authority to address issues such as safety in school zones; we didn't recommend what they should do. The Borough then formed a committee to address this issue, hold public meetings, etc.

Nichols commented that this problem was brought before the Board. The S&TC did a good job looking at the scope, and can narrow it further. What's the next point – do we have the laws in place that adequately address this? He would like to see more detail on what other states do and what the current rules are.

Freeman reported that DOF put together summary about 18 months ago on public safety standards regarding landslide hazards in Oregon, Washington, Tongass National Forest, and FRPA; identified holes in the regulations, such as the lack of definitions for key terms, and a lack of regulations for helicopter operations and selective harvesting.

Rogers observed that the extent of the issue is small. A land exchange is the ultimate solution – it would be a win-win. It may be an option to table this issue. We don't want to frustrate the exchange process as an unintended consequence of our efforts. We do not want to ignore this issue, but we could see how the exchange progresses.

Wolfe observed that pursuing land exchanges with the USFS take long time – we may be very old before there is action.

Slenkamp expressed concern that risk maps could affect an appraisal for the exchange by saying the land cannot be harvested. Maisch replied that the maps wouldn't say the land can or can't be harvested, but might require a geotechnical analysis. Nichols said that the maps would put different requirements on that parcel, partly because the issue has been elevated. Slenkamp said that the impressions of viability could affect the parcels' value. The Trust is moving forward with the exchange, will have a formal proposal on October 27. If successful we could address concerns about landslides, improve fiber availability on Prince of Wales Island, and establish the Trust for long-term financial return, and more efficient management. This would be an equal value exchange.

Wolfe noted that the slope stability is not new information for this parcel – the USFS and others are already well aware of the issues. The Tongass National Forest routinely has a soil hazard and risk analysis layer requirement for its sale. Wolfe would like to talk more with Slenkamp about the Trust's proposal. Maisch noted that multiple land entitlement issues are at play. Would be valuable to continue

- AG advice on whether we could narrow public safety under FRPA to landslides only
- Definitions
- Holes re helicopter harvesting/selective harvesting BMPs and consideration in risk areas.

We recognize that people could go to other venues if the Board doesn't act. We have the guidance from the last motion. Do we want to undertake a recommendation relevant to other authorities?

Wood said that the January 2008 letter to DOF from the Attorney General says that the Board doesn't have the authority to adopt public safety standards without legislative action to change statute. The

original MHHA amendment proposal is strictly for landslide hazards in populated areas – the affected area is a small percentage of the forested acreage, and a large percentage of the population in this area. The issue will only get worse with more people and more land sales. He referenced a paper from the Oregon Landslide Public Safety and Project Team: “the Board’s guiding principles include protection of the public in a shared responsibility, including forest practices regulations...”

Wolfe said there should be an Attorney General’s Office representative on the Administrative Group, to provide information on other state laws that may be relevant.

Vinsel noted we were listing and identifying other options, but not necessarily pursuing them further.

Nichols said that this issue will not go away, nor will it be the only issue with adjacent private landowners. If we practice good forestry we are taking public safety into account regardless. He urged the Board to not get so tied up in public safety; FRPA deals with landslides and water quality, and that will address the majority of the issues.

Foley said that the implementation group should convene; that valuable data gathering occurred; and that a look at other states is valuable – we shouldn’t have to repeat other’s work. DOF could revise or add to its white paper to address public policy, technical, and legal issues raised. The problems have been delineated – this is a narrow public safety issue, the limited scope needs to be emphasized. We should identify, not pursue, solutions outside FRPA. Possible solutions have been identified. An implementation group can comment on each of those and boil this down to present to others in a practical way.

Maisch said that DOF could bring specific FRPA recommendations, then Board could make a decision on whether to address public safety or not.

Nichols asked whether mining rules and regulations address public safety. Foley said that safety is addressed through the public agencies, e.g., dam safety. It is all case by case.

Cronin would like an analysis of the existing situation, what others do, and what isn’t covered by FRPA. He doesn’t want recommendations – he doesn’t want to be boxed in before seeing the analysis. A second effort would be meetings to clarify the question of who deals with public safety.

Maisch would like to do the first box (items within FRPA authority) and come back with recommendations, which the Board could adopt or not, e.g., definitions, and BMPs. Freeman said that this process would include stakeholders. Maisch said that DOF would also get an Attorney General’s response to the question of narrowing public safety to landslides. Based on that answer we could decide where to go on whether to address the public safety question, and if so, how.

Cronin said that people take for granted that we have no harvesting in buffers or old growth reserves without any specific effort to manage the forests. Here we have another risk and another impact. Foley agreed and said that could be kept in mind throughout the process.

Cronin asked who is liable if a forest landowner doesn’t harvest timber and a wildfire burns off their land and burns dwellings -- is it the liability of the forest landowner? DOF should get the Attorney General to say who should deal with this. Foresters should figure out the prescription for the ground in the Petersburg area.

Nichols asked how big this issue is. A total of 7,500 acres are in the scoping areas adjacent to populated areas, and the USFS won’t harvest their portion. Forest activity on municipal and private land is questionable. The Mental Health Trust harvested in Wrangell, partly harvested in Ketchikan, and its

remaining areas with potential hazards are primarily in Petersburg. The amount of University land affected is small. The state is public landowners and is very concerned about liability. Probably 90% of the ANCSA corporation land in the scoping areas is already harvested, including Klawock, Eyak, and Kivilco land. All the Sealaska land in the identified areas has been harvested. Are we going to write legislation for one area?

Maisch commented that the concerns would also affect future second-growth harvests. Nichols questioned whether we want to legislate for conditions that are 30 years out – our forecasting isn't good. Probably 5,000 of the 7,500 acres have already been harvested without a public safety issue to date. This is a one-parcel issue – how do we handle it?

Maisch said that if the legislature changed FRPA, it would just provide the authority to address issues. The specifics would be in regulation.

Wolfe said that the FRPA process has usually had both an S&TC and an implementation group. We're only partway through the process. We still need to address economics, etc. FRPA isn't going to say some areas are not suitable for timber use. We need to look at a toolbox, and we'll have to include others in this process. One of the four founding principles for FRPA was "bang for the buck". The implementation group should take the analysis and look at policy options under the FRPA principles, including consideration of economics.

Freeman commented that having an implementation group look at options outside FRPA is different from the charge to prior groups, and is outside Board of Forestry authority. Nichols agreed – the Board isn't constituted for that purpose. Issues on land use are broader, for example there are aesthetics issues. This is partly a land use issue, such as borough land classifications. Homeowners want us to make a "No, you can't/Yes, you can" decision and FRPA is not set up for that. The FRPA process is a DPO review process, not a permit process.

McLarnon asked whether the S&TC looked at slopes less than 67%. Freeman explained that the model initially looked at slopes $\geq 67\%$, but added a second, separate category of slopes from 55-67% after S&TC review. The S&TC found that the initial model did not adequately identify areas with known slide histories until the 50-67% category was added.

Wolfe said that he is not trying to expand BOF authority. The implementation group can at least point to other authorities. When the current FRPA was developed in 1989-90, the process also looked at Title 16 and decided it was outside FRPA. The option of amending FRPA has tremendous policy implications. Other mechanisms may be alternatives, and the implementation group can just cite them.

Nichols observed that there has been lots of selective harvesting – the committee could look at what happened in these areas. A lot of old growth was harvested before houses were built in the hazard areas; now there is second growth above the houses.

Cronin asked whether there are forest engineers who can assess mass wasting risks. Nichols replied that he is a forest engineer. Forest engineers study slope failures, and assess what triggered them. In the Mitkof case, both sides hired professional geologists and you can't get a definitive answer. There are microclimates with intense local storms and high winds. Tree rocking opens up slopes. Forest engineers conduct analyses afterwards, but it's hard to say definitively why slides occur. It's hard to go back after the fact and determine whether or not a slide would have occurred without harvesting.

Maisch noted that some other states have addressed this issue in their forest practices acts. He asked whether it is worthwhile to develop best management practices (BMPs) for partial harvesting and

helicopter operations in hazard areas, even if the FRPA authority is not changed i.e., would they be useful for protecting water quality and fish habitat.

Freeman briefly summarized Oregon's approach which requires a site-specific analysis in high hazard areas before any harvesting can occur.

Moselle said that the main question for the S&TC was to determine whether the issue was limited to Mitkof, or whether it was broader. He also noted that under FRPA, the triggers for on-the-ground prescriptions are roads on "unstable slopes", "slide-prone areas", and "steep slopes" and "slide-prone" and "unstable slopes" are undefined. Nichols commented that the DPO form has boxes to check for "unstable slope" or "recent slides".

Nichols asked how the safety issue can be limited to landslides – what about fire? Maisch said that you could limit an amendment to public safety associated with landslides, but he didn't know what would happen if there was a legal challenge. He added that landslides are more tied to a specific geographic location than fire.

Nichols asked whether the review of other BMPs contained anything not in FRPA other than a required geotechnical analysis. Is there anything on selective cutting?

Mike Curran, DOF, commented that recent Mat-Su Borough ordinances address some other safety issues, such as logging trucks on local roads with school buses, as well as noise and lights. These are not FRPA issues. Maisch commented that he hopes that each local jurisdiction would not develop separate ordinances and create a new, third level of forest regulation, instead of providing one-stop shopping through FRPA. Curran noted that the Ketchikan Gateway Borough instituted a buffer, and some zoning laws already impinge on forest operations. He agreed that local governments will increase regulation if they are not satisfied with the state's response.

Wolfe said that FRPA is not all-inclusive – it doesn't cover Title 16 permits. We could look at the balance of FRPA and what it should address. Can we surgically address public safety without broadening it? It may be hard to prevent a spread in future years. Maisch suggested that we could set up a system to just raise the bar in high-risk areas.

Cronin said that we don't really know whether a particular activity caused a positive or negative effect – the same is true for wildlife issues.

Nichols stated that a lot of woody debris and gravel in creeks is from landslides, which created some of the fish habitat.

Wolfe stated that the Board already passed a motion in August. Bosworth said that he is uncomfortable working outside FRPA. The Board should put sideboards on and work within them.

Foley said that fundamental public policy questions have been raised. It is hard to address them without going outside of FRPA. This is a real management issue that we can't adequately address if we are confined to FRPA. Nichols said that public safety is beyond FRPA, but slides trigger water quality and fish habitat issues that are under FRPA. IS the existing Act satisfactory to prevent slides? We don't want slides regardless of safety issues – is there something else we could do to prevent them within FRPA? Vinsel said that if our standards protect waterways, then perhaps other entities could use the same standards for other activities.

Wolfe said that the regulations are already sufficient. The public safety issue is triggering this discussion. Can we open up the Act to address public safety surgically?

Nichols said that you can't prevent all slides --slides also occur without forest operations. How can you keep an operation's ability to do anything when you can't say whether or not forest activity caused a particular slide?

Maisch said that DOF will contact the Attorney General's Office to determine whether we could legally narrow the public safety issue in FRPA to landslides only. We can make recommendations to other authorities to deal with other pieces of the public safety issue. For the next Board meeting, we will have an answer to the legal question, a summary of current FRPA best management practices, and will identify any "holes" in the BMPs.

Attendance

Clarence Clark, DOF, speaker
Mike Curran, DOF, speaker
Mark Eliot, DOF, speaker (by teleconference)
Marty Freeman, DOF, speaker
Jeff Graham, DOF, speaker
Owen Graham, speaker

Kevin Hanley, DEC (by teleconference)
Kyle Moselle, ADF&G, speaker
Joel Nudelman (by teleconference)
Rick Rogers, DOF, speaker
Jim Schwarber, DOF, speaker
Ed Wood, Mitkof Highway Homeowners
Association (by teleconference)



MINUTES
Board of Forestry Meeting
Wednesday-Thursday, March 17-18, 2010
Anchorage, Alaska

Wednesday, March 17

Call to Order and Roll Call. Chairman Maisch called the meeting to order at 8:35 a.m. Anchorage and Fairbanks teleconference rooms were connected. All board members were present: Rob Bosworth, Jeff Foley, Erin McLarnon, Matt Cronin, Wayne Nicolls, Mark Vinsel, Ron Wolfe, and Eric Nichols.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

FRPA standards re landslides and public safety.

Selective helicopter logging video. Marty Freeman, DOF, introduced a video of selective helicopter logging at Echo Cove, north of Juneau. Freeman noted that Board and agency discussions have referred to options for selective logging by helicopter in potential landslide hazard areas. This type of operation differs from the conventional clear-cut logging sites the Board visited on Prince of Wales Island last August. However, DOF and the Science and Technical Committee have not found any literature documenting studies of helicopter partial harvesting with respect to landslide occurrence. It is also difficult to see much on the ground in a winter field trip, but Goldbelt, Inc. produced a 9-minute video of operations about 1997 on their land at Echo Cove with photography of selectively-logged helicopter operations.

Joel Nudelman, DOF, also showed recent imagery of the logged area shown in the video. He noted that it is hard to find the harvested areas on photos, even at a detailed scale.

Nicolls said that selective helicopter logging is poor utilization of the wood resource. Nichols responded that Goldbelt, Inc., the landowner, wanted some money from their land without devaluing it for other uses. Utilization was lower, but the logger only took trees that could pay their way out. It was a landowner decision to optimize income from a costly operation. Maisch recognized that Goldbelt had other objectives for this property.

Vinsel recounted that he has walked the bank at Echo Cove repeatedly and it has healthy rearing for Dolly Varden and an influx of other salmon species. The waters coming out of the woods look healthy and undisturbed. He wouldn't have known it was logged. It is a nice play to enjoy – as much as before.

Nichols noted that the video was a promotional video, but as Nudelman's before-and-after imagery shows, there's little impact over time. He was unsure how steep the slope was at the Echo Cove site. Slenkamp noted that he had been involved with helicopter yarding on steep ground in Ketchikan and there haven't been slides there in the three to four years since harvesting.

Past harvesting. At prior meetings, some Board members noted that timber harvesting has already occurred in some of the polygons on the scoping map that are adjacent to inhabited areas. Based on staff knowledge, DOF identified polygons which were previously harvested, and the method of harvest. Harvesting has occurred in most of the polygons. Freeman showed PowerPoint slides of the landslide assessment maps with annotations for past harvesting dates and methods.

Update on response to Board requests. Freeman also summarized actions regarding landslides and public safety since the October 2009 Board of Forestry meeting. At that meeting, Board members requested that the Division

- Revise the title and legend on the scoping maps,
- Consult with the AGO to determine whether public safety could be added to the FRPA section on mass wasting without affecting the other sections.
- Identify who has responsibility for public safety, and
- Identify options for addressing public safety issues associated with landslides.

DOF consulted with the Attorney General's office, who advised us that public safety could be added to one section of the FRPA, e.g., AS 41.17.060(B) (5) without requiring that public safety be considered under the Act's other provisions.

DOF also prepared four documents (*see handouts*). The first is the revised text for the scoping map legend (*see handout*). The second is an update of the *White Paper on Landslides, Public Safety, and FRPA*. The update includes a summary of the science and technical committee findings, an expanded section on other approaches to this issue that includes British Columbia and California, and a section on authorities for public safety.

- British Columbia – The B.C. forest practices act does not specifically address public safety and landslides, however, the Minister of Forests and Range has the power to intervene on any activity that is likely to have a catastrophic impact on public safety. The minister can stop the activity and require a remedy or mitigation.
- California -- The state review team for a timber harvest plan includes an engineering geologist who reviews the plan with respect to slope stability, and inspects sites if necessary. One purpose of site inspections is to look for public safety hazards, and if appropriate recommend additional measures to reduce hazards to public safety. The California Forest Practices Act doesn't directly address public safety, but actions under the Act must be consistent with the California Environmental Quality Act, which does include public safety. Timber Harvest Plans are also subject to interagency review and public hearings. In addition,
 - Use of heavy equipment for tractor operations is prohibited on steep or erosive slopes.

- Mechanical timber harvesting other than cable or helicopter yarding is prohibited in winter.
 - Site-specific exceptions may be made through an individual Timber Harvest Plan.
 - Sensitive watersheds may be identified for additional planning and protection measures; designation is based in part on risks to public safety.
- Authorities for public safety reside in multiple agencies and all levels of government. At the state level, at least nine departments have authority for certain aspects of public safety. Local governments (e.g., municipalities under AS 29) and federal entities (e.g., OSHA, Federal Highway Administration, and Homeland Security) also have public safety authorities.

The third document is a draft chart showing options for addressing public safety issues from landslides associated with commercial forest operations. Freeman prepared the draft and consulted with other agencies to make sure information on authorities was correct. DOF has not pulled together an Implementation Group to further identify options – before undertaking that effort, the Division wants to be sure that the Board needs additional information beyond the chart. An Implementation Group requires a significant commitment of time from agencies and private entities, and many of the options are outside FRPA authority. The Board could not pursue those options beyond making recommendations to the responsible entity.

Lastly, we prepared a draft decision tree showing four general paths for addressing FRPA-related portions of the public safety issue:

- I. Amending FRPA to add public safety to the considerations for preventing or minimizing adverse effects of erosion and mass wasting
- II. No change to FRPA; Amend the regulations to adopt definitions to clarify authorities and BMPs to minimize effects on fish habitat and water quality, e.g., BMPs for helicopter yarding, selective harvesting, etc.
- III. No change to FRPA or regulations. Initiate addition non-regulatory actions such as training.
- IV. No new FRPA-related action.

Under all options, existing BMPs would apply, along with civil liability, and opportunities to address safety issues through local ordinances.

Like the Board, the Division of Forestry has been seriously weighing the options for addressing this issue. At this time, the Division’s preferred alternative would be Option II on the decision tree. This would update the FRPA regulations to clearly define key terms, including,

- “unstable or slide-prone slope” (11AAC95.200(a)(9); .290(a),(b),(d)); .345(b)),
- “slope that has a high risk of slope failure” (11AAC 95.280(d)(1)), and
- “fill material prone to mass wasting” (11 AAC 95.290(b) (2)), .345(b) (4).

It would also establish BMPs for harvesting and yarding methods in unstable or slide-prone areas, possibly including requirements for helicopter operations or partial harvesting in these areas. We believe Option II is necessary to address gaps in the existing BMPs, which would not be addressed by options III or IV. It also retains FRPA’s focus on resource management, although these changes for water quality and fish habitat would have side benefits for reducing public safety risks. Given the small footprint of populated areas in risk zones on the scoping map, and the variety of land use actions that could result in slide hazards in populated areas, we believe the public safety component of landslide hazards is best addressed through land use regulation authorities. Freeman noted that areas with potential for slides near Hollis, Whale Pass, Port St. Nicholas, and Klawock Lake are currently outside incorporated communities.

If the Board chooses Option II, DOF would convene a scientific and technical committee to recommend definitions and updates to the BMPs, followed by an implementation group to determine how to best implement the technical recommendations on the ground.

Maisch asked whether the potential slide area on Mitkof Island is in the Petersburg borough. Ed Wood, Mitkof Highway Homeowners Association (MHHA), responded that Petersburg is a city, not a borough. Petersburg doesn't have land use regulations or zoning on that hillside yet. The city does have a hazard mitigation plan, and landslides are listed as the second priority for hazards, after downtown conflagration. Wood noted that the Board previously advocated for "one-stop shopping" rather than a collection of local ordinances to address this issue. Maisch recognized the value of "one-stop shopping", but noted that some local governments such as the Mat-Su Borough already have local zoning that affects forestry. Nichols said that is true for the Ketchikan Gateway Borough as well. Wolfe stated that "one-stop shopping" is a laudable goal, but forestry operations also have Title 16, resident fish, and US Coast Guard regulations to deal with.

Nichols said that Freeman and the committee have done an exceptional job of answering the questions that came up. There are numerous high-risk areas, and all have been harvested. He is not aware of public safety issues in the last 20 years associated with those harvests. There is one parcel that's unharvested, and it's involved in a potential trade with the Mental Health Trust. Even areas harvested in 1960 wouldn't be harvested for at least another 20 years.

Cronin asked what would happen if there was a forest operation on state land, and there was an accident with logs rolling off a truck and impacting private property. Maisch responded that there would be an Occupational Safety and Health Administration (OSHA) investigation, a check for negligence, and troopers would be involved if it were on a highway. An actual log truck to log truck accident with property damage was handled like any other accident on a public highway. If a fatality occurred, OSHA would definitely be involved. DOF dealt with one fatality on a logging road at a railroad crossing. Cronin asked what would happen if a forest practice involved some impact other than a landslide. Nichols replied that almost every major landowner, including the state, requires general liability insurance. If there's an accident, there is a determination of whether it was operator error or beyond the operator's control. Wolfe said that Sealaska even requires silviculture operators to have liability insurance. Vinsel asked whether a policy would still be in effect if something happened after logging. Nichols said that had never been tested. If something is associated with logging, it usually happens in a relatively short period of time, such as the following period. The big argument will be whether it was an act of God, or something done outside the law. Slenkamp noted that the Alaska Department of Transportation and Public Facilities has jurisdiction on all rights-of-way within 100' of the centerline.

McLarnon thanked the Science and Technical Committee. This issue was first brought up in fall 2007. She hoped the Board can come to a decision to give the MHHA some resolution. She asked how additional BMPs would affect loggers. Nichols replied that it would depend on the BMP. If helicopter logging is required it would be the first time. A buffer would affect the landowner. Other BMPs could be not letting slash accumulate. Freeman said that possibilities that have come up in requirements for helicopter logging, selective harvesting, on-site geotechnical reports, or there could be other guidelines. Wolfe said there could be considerations for where timber is left standing, such as V-notches, or steep slopes.

Nichols commented that the DGGs report (*see handout*) recommends identifying areas on the ground that had past slope failures, but the report notes that other areas may also be unstable. There are many slumps and failures both with and without harvesting that wouldn't have been identified in advance. Wolfe agreed, and said all landowners have seen that.

Paul Slenkamp, Mental Health Land Trust (MHT) forester, gave kudos to the Science and Technical Committee for its research. It shows that due to slope stability guidelines FRPA is functional and works well even compared to other states, even if it doesn't address public safety. With respect to the necessity of site-specific examinations – that happens in timber sale planning. It's in the landowner's interest to reduce risk. The specific Mitkof issue can be addressed through local zoning. Most of the identified

areas in southeast have been previously logged with no prior impacts. He would like to show the Board the Signal Mt. and Minerva Mt. harvest areas near Ketchikan as example of logging near residential areas with no safety issues.

There's a fact sheet in the Board packet about the proposed MHT land exchange that would include the Mitkof Island area (*see handout*). Many high-value lands adjacent to communities went to the MHT to reconstitute the original land trust. The highest and best use for the Trust is timber harvest to generate revenue to provide mental health services. The Trust doesn't have a real option not to use these lands. The exchange includes lands near the Juneau, Wrangell, Petersburg, Meyers Chuck, Sitka, Skagway, and Ketchikan communities. The exchange proposal was started in response to resistance to harvest on the Mitkof hillsides. Slenkamp agreed that logging could be an eyesore. The MHT identified about 20,000 acres on Mitkof and near the other communities to exchange for about 50,000 acres of USFS land on Prince of Wales Island. The two pools of land will require an appraisal and then a value-for-value exchange. The MHT lands are high value because of proximity to communities for aesthetics and future land development. MHT lands are likely to be appraised at higher value than timber lands. There's a lot of public support for the proposal. One of the purposes in identifying 50,000 acres on Prince of Wales Island is to try to help sustain a timber industry. Slenkamp estimated that MHT could have a 20 MMBF sustainable harvest from the 50,000 acre land base. This is about the volume currently processed on Prince of Wales Island. Mental Health forest management would help the transition to young growth management. The MHT has committed to an in-state manufacturing program along with some export to maintain a viable economic ratio from the exchange lands. Timber activities would be regulated under FRPA, which provides for fish habitat and water protection. Subsistence and other public activities would continue to be allowed on land acquired in the exchange. Slenkamp noted that the MHT website has maps and other information on the exchange proposal. A bill has been drafted and should be introduced in Congress soon.

Nichols asked whether the MHT is committed to proceeding with an exchange regardless of how many acres they would receive in a value-for-value exchange, e.g., if it wound up being a acre for acre exchange. Slenkamp said that would depend on the specifics. Nichols asked how long it would be before MHHA will know what will happen. Slenkamp said that the best case a two-year process if legislation passed in fall 2010, followed by the appraisal process.

Slenkamp stated that if the FRPA changes in a way that would make the MHT land unharvestable, it would have a negative effect on the appraisal which could make the exchange unworkable. In response to a question, Slenkamp confirmed that the Alaska legislature also would have to approve the exchange.

McLarnon asked how soon the Mitkof parcel might be harvested. Slenkamp answered that the MHT had previously submitted a DPO and issued a contract. They stepped back from that at an economic cost to the Trust. They have since lost markets. The Trust's only option is to use its land to generate revenue. Cash flow from investments in recent years has not been good, so the Trust is looking for money. The mental health clients of the state are the beneficiaries of MHT revenue. The exchange is a win-win-win for communities, Trust beneficiaries, and timber.

Wolfe said that the two-pool concept makes perfect sense. Factors such as aesthetics will have little value in an appraisal. Do these steep lands have a higher and better use than timber? Slenkamp said there could be in the future for the slopes, and there are some parcels close to the road that have other values now. Wolfe asked how the exchange would be affected if FRPA prohibited timber harvest on this area. Slenkamp said that if areas cannot be harvested it would reduce the exchange value, and even timberland has a relatively low value. Nichols commented that the only high value is where land can be subdivided. Slenkamp noted that the MHT also has a land sales program, and it's very easy to saturate the market in these areas.

Maisch recounted that when the FRPA riparian buffers were established, some people said it was a taking, although landowners voluntarily agreed to the buffers. Additional restrictions on steep slope harvesting could have a risk of taking unless agreed to by all parties. Slenkamp noted that helicopter harvesting limits future economic value – you can only fly the high-grade timber out. It's an expensive process. Nichols asked what the MHT would require if it harvested the Mitkof tract today. Slenkamp replied that the prior DPO was for a selective harvest with helicopters in slide-prone areas, and limited road construction. It would be hard to go back in now. Nichols asked whether there is an agreement with the MHHA not to do anything prior to an exchange decision. Wood said no, but that the MHT Land Office director Harry Noah agreed to look at the issues before deciding.

Wolfe noted that a resident asked the Petersburg City Council about an 80-acre exclusion to the exchange. Slenkamp explained that the MHT excluded an 80-acre parcel with two active rock pits on Mitkof from the proposed exchange. Access to the parcel has been difficult. There are steep slopes above it, but slopes within the pit area are about 20%. Operators have blasted in the rock pit for years without slides resulting. The MHT decided to retain that parcel. There may be subdivision potential in that parcel. Wolfe asked whether excluding that parcel would affect slide potential. Slenkamp said that there's been a lot of past activity on that site without slides, and he would expect that activity to continue that. He noted that the Petersburg City Council did pass a resolution asking the MHT to include that parcel in the exchange proposal.

Wolfe recommended that decision tree Option III, including training, should remain an option. The length of what would be involved in Option II might not be merited by what would come out of it. The State Forester could use a stop work order to prevent problems. Maisch explained that the state forester can only issue a stop work order for an existing or likely violation of the Act – not for public safety. He concurred that training is important, but said that Option III doesn't get to where we need to go, especially with respect to helicopter logging which wasn't a common practice when FRPA adopted.

Cronin asked whether the second decision point on the tree operates under existing authority only. Maisch said yes.

Nichols said that in a landslide situation, if you have a public safety issue, you have already impacted water and fish. If you address water, fish, and landslides adequately it will address public safety issues associated with landslides. Cronin agreed that if you develop BMPs to protect water quality and fish habitat you will reach the same goal.

McLarnon asked whether the DPO has a check box for steep slopes. Nichols said there is a box– for unstable slopes. Freeman added that there are BMPs attached to areas with unstable or steep slopes. Nichols asked whether a check in the steep slope box warrants an on-the-ground inspection. Could that be a public safety check-box? Maisch said that it couldn't be a public safety check-off without a change to the Act. Nudelman said that seeing a check in the box does alert reviewers, and those operations typically get added scrutiny. DOF can't tell landowners they can't operate in those areas, but can make recommendations. In Icy Bay, for example, DOF recommended against an upper road, which the proposer pulled back.

Vinsel said that with the Mitkof Highway close to the road and the marine channel, fish migrate there. He agreed that threats to public safety also would affect fish.

Clark recounted that he has been on both sides of a DPO. As a DOF forester, he would want to do a prior inspection on a DPO with steep slopes and roading. As an operator, he would want DOF to come out as another set of eyes to check layout. He might also want to check with DEC. ADF&G may or may not want to come out.

Wood reported that there is only one salmon stream in the MHHA area and it is not in the MHT area. He said that he did ask Pat Palkovic, DOF forester, to come and check for public safety concerns and she declined to do that. Maisch said that it is correct that DOF couldn't consider public safety as part of the DPO. Wolfe said that there would still be water quality issues.

McLarnon wants to be sure that the Board's choice doesn't jeopardize a land exchange -- would rumors of a process affect the effort to go to the Legislature in the fall? Would Option II jeopardize a land exchange? Slenkamp said it would depend on what BMPs are written. The MHT proposed timber sale already implemented BMPs much beyond what DPO required. Risk is something the Trust deals with. If new BMPs reduce the amount of timber to be harvested, it would affect an exchange. Maisch said that the proposed exchange shouldn't be weighted too heavily. Wood commented that the MHT lands may not be valued higher in an appraisal, but they have a high political value.

Freeman clarified the process under Option II – DOF would convene a Science and Technical Committee which would make recommendations to the Board. If the Board believes the recommendations are on the right track, DOF would take them to an Implementation Group with representatives of the affected interests, including forest landowners, homeowners, timber industry, etc. The Implementation Group would be charged with figuring out how to make the science and technical recommendations work on the ground in a practical manner. The group's recommendations would be brought back to the Board for their review before deciding whether or not to proceed with the formal regulatory process. DOF wouldn't proceed with regulations on which the Board can't reach consensus.

Cronin suggested that if the agencies saw something going on that was counter to the law but not in their authority, they could notify whoever does have that authority. Option II is a good way to go, as long as problems identified are forwarded to whoever does that authority. Maisch noted that no entity currently has authority for this issue except for local governments, and they haven't taken that step in the Petersburg area. Cronin said that if FRPA has good BMPs for its authority, but citizens still have concerns, it's out of our hands. We're going in circles because we don't have the authority. Maisch noted that the issue for the Board is whether to request a statutory change to grant that authority to FRPA.

Nicolls observed that the Board is working hard to try not to amend the Act. Down the road there might be other safety things that might have us want to get into safety. Maisch noted that under in AS 41, DNR does have public safety responsibility for life and property with respect to wildland fire. Equipment safety issues are covered by OSHA. Nichols said that the two issues are the potential for slides and for impacts to water supplies. Hanley stated that drinking water supplies are covered by DEC. Wolfe commented that there is a narrow incidence of this problem.

Wolfe agreed that restrictions on harvest can affect land value. However, with the variation process the timber industry can get significant value out of riparian areas. We shouldn't ignore value – if harvest were to be prohibited, we would have to look at that. If changes put a private landowner in that position, they have changed the dynamics of FRPA.

Bosworth moved, and McLarnon and Nicolls seconded the following motion:

- ▶ **That the Board adopt Option II from the decision tree. McLarnon and Nicolls seconded.**

Nichols said that he wouldn't support Option II because he didn't know what direction the BMPs would take. He supported Option III with training for DOF. If the unstable slope box checked, a field visit should be required. He is willing to consider recommendations for BMPs before endorsing. Freeman clarified that Option II isn't a commitment to adopting regulations, but it is a commitment to draft proposed BMPs which would then come back to the Board for a recommendation on whether to proceed

or not. Wolfe said that the Board needs to vote the motion up or down, or offer a friendly amendment clarifying that. The offeror and seconders accepted a friendly amendment to the following language.

- ▶ **That the Board adopt Option II from the decision tree. Option II is the process of drafting BMPs for review by the Board before deciding whether or not to proceed toward adopting them as regulations.**

Cronin asked whether there are other non-regulatory options besides training. Foley suggestion that there could be more inspections.

- ▶ **Motion unanimously adopted.**

Freeman said the next step would be convening a Science and Technical Committee to recommend appropriate BMPs. She asked for Board input on the types of expertise that are needed on the committee, and on individuals who can provide that expertise.

Nichols recommended including helicopter harvesting expertise, and recommended Columbia Helicopters.

Cronin asked whether there is a way of getting at taking issues if recommended BMPs would restrict landowners' ability to harvest timber. Maisch said that "taking issues" were addressed in developing the riparian buffers. Private landowners willingly donated that value for the greater good. Cronin said that issue should be reexamined by the state as a whole. The state has discussed the decline of the timber industry, and more restrictions on harvesting or a reduction of the land base is a concern for industry survival. Wolfe said that he appreciated Cronin's identification of the issue. However, if the state undertakes that they should do it from a resource perspective, otherwise we'll be back to 1989 with two opposing lines of high-paid lawyers and ten years of litigation. He is hesitant to go there. FRPA gave the industry the rules they needed to operate. Nichols added that one of important compromises was not having a revocable permit.

Wolfe requested that Science and Technical Committee meetings be kept in southeast Alaska, since that's where the issue is. The agencies should recognize that it's an expense for the industry to participate. Freeman agreed, and noted that meetings to date have either been held in southeast or conducted as web meetings.

Attendance

Paul Brewster, USFS
Clarence Clark, DOF, speaker
Mike Curran, DOF, speaker
Mark Eliot, DOF, speaker (by teleconference)
Marty Freeman, DOF, speaker
Cindy Gilder, DEC (by teleconference, Anchorage)
Jeff Graham, DOF, speaker
Kevin Hanley, DEC
Kerry Howard, ADF&G, speaker
Bob McAlpin, DOF
Michele Metz, Sealaska

Kyle Moselle, ADF&G, speaker
Joel Nudelman, DOF
Rick Rogers, DOF
Kristen Romanoff, ADF&G, speaker
Jim Schwarber, DOF, speaker (by teleconference)
Paul Slenkamp, AMHT
Nathan Soboleff
Ken Stump, DOF
Jackie Timothy
Ed Wood, Mitkof Highway Homeowners Association (by teleconference)
Matt Weaver, DOF, speaker



MINUTES
Board of Forestry Meeting
Monday-Wednesday, August 23-25, 2010
Fairbanks and Tok, Alaska

Monday, August 23, Fairbanks

Call to Order and Roll Call. Chairman Maisch called the meeting to order at 8:10 a.m. Anchorage and Fairbanks teleconference rooms were connected. All board members were present: Rob Bosworth, Jeff Foley, Erin McLarnon, Matt Cronin, Wayne Nicolls, Mark Vinsel, Ron Wolfe, and Eric Nichols. The Board positions for the Native Corporation, Forest Industry Trade Association, and Non-governmental Fish or Wildlife Biologist seats expired at the end of June. Maisch announced that all three current members – Ron Wolfe, Eric Nichols, and Matt Cronin were reappointed.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

FRPA standards re landslides and mass wasting. Freeman reported that the Science & Technical Committee that has been formed to review the FRPA mass wasting best management practices (BMPs) will convene on September 2, 2010 in Juneau. The handouts include the list of S&TC members. This is the same group that worked on the scoping phase, with the addition of Bert Burkhart from Columbia Helicopters to provide expertise on helicopter systems. The handout on organization and operations describes the S&TC approach, which is the same used for prior science and technical committees. It will operate as a working group, focused on the issue of mass wasting BMPs. Meetings are open to the public, and DOF recently sent a letter to the mailing list announcing the process. Freeman will also send copies of the minutes from all meetings to the public mailing list. Currently, 74 agencies, Native corporations, local governments, organizations, and individuals are on the list, including the Board members. Freeman is glad to add others who may be interested.

The Board handouts also include a copy of the updated white paper on landslides. It summarizes the work to date, the Board's charge to the S&TC, and existing mass wasting standards in Alaska and other west coast states and provinces.

Nichols asked how long the process would take. Freeman said she expected to have recommendations to the Board for the spring meeting. The S&TC is not starting from zero – they will review the existing regulations, the scoping committee developed draft definitions, and this group has a narrower scope than prior science and technical committees.

Wolfe asked whether the Mental Health Trust is continuing with its land exchange plans. Slenkamp affirmed that the Trust is actively pursuing the exchange. Wolfe recognized that exchanges take time. He asked whether the subject lands in the Mitkof Homeowners area that created concerns are all in the exchange area. Slenkamp replied that the Trust is doing a strategic analysis of the parcels. There's an 80-acre area that is still being reviewed, but looks like it has better potential for development purposes. It's a small amount in the large scheme of things, but the Trust recognizes that it has a large effect for the Mitkof homeowners. He noted that the landslide risk issue could also be dealt with by Petersburg as a local zoning issue. Wolfe said that he was at a Petersburg Council meeting when a resident spoke about their concerns. Slenkamp noted that there are similar lands that have not had landslide problems, however. Wolfe remains interested in the problem area at Mitkof that started this process – if there's another solution there it would provide relief for everybody.

Ed Wood, Mitkof Highway Homeowners Association, asked whether the forest practices BMPs are regulations or guidelines. Freeman said that in Alaska the BMPs are adopted by regulation. Maisch noted that Pamalyn Duvall from Representative Wilson's office contacted DOF for examples of other local ordinance examples that affect forestry.

Attendance

Paul Brewster, USFS
Ron Brown, AIDEA
Sen. John Coghill, Alaska Senate
Mike Curran, DOF, speaker
Mark Eliot, DOF, speaker
Marty Freeman, DOF, speaker
Kevin Hanley, DEC
Doug Hanson, DOF, speaker
Dave Harris, USFS, by teleconference
Kerry Howard, ADF&G, speaker, by teleconference (Tues. only)
Patricia Joyner, DOF (Wed. only)

Kyle Moselle, ADF&G, speaker
Devany Plentovich, AEA
Rick Rogers, DOF, speaker
Jim Schwarber, DOF, speaker
Paul Slenkamp, AMHT
Nancy Sonafrank, DEC
Charley Streuli, USFS
Sue Willits, USFS
Ed Wood, Mitkof Highway Homeowners Association (by teleconference)
Trish Wurtz, USFS, speaker



MINUTES
Board of Forestry Meeting
Monday-Tuesday, December 13-14, 2010
Atwood Building, Anchorage, Alaska

Monday, December 13

Call to Order and Roll Call. Chairman Maisch called the meeting to order at 8:05 a.m. Juneau and Fairbanks teleconference rooms were connected. All board members were present: Rob Bosworth, Jeff Foley, Erin McLarnon, Matt Cronin, Mark Vinsel, Ron Wolfe, and Eric Nichols. Wayne Nicolls arrived 8:20

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

FRPA standards re landslides and mass wasting. Marty Freeman, DOF, summarized the work of the Landslide Science & Technical Committee (S&TC)(*see handouts*). Following the completion of the scoping process to assess landslide hazards, the Board asked DOF to convene a science and technical committee to review, and where appropriate, recommend updates to the FRPA best management practices for landslides and mass wasting associated with forest operations.

The S&TC met four times from September to December, 2010. Members included state and federal scientists with expertise in soils, hydrology, geology, road engineering, fish habitat, water quality, and FRPA implementation, and a private sector expert in helicopter harvesting.

The S&TC updated and expanded the landslide bibliography to include information on

- Landslide effects on fish habitat,

- Effects of forest practices on landslide risk,
- Links between soil disturbance and slope stability, and
- Techniques for assessing landslide risk.

Eleven references were added to the bibliography, of which two were highlighted as key documents for Alaska.

The S&TC also worked on definitions relevant to landslides and mass wasting.

- “Mass wasting” is already defined in the FRPA regulations, and the Committee recommended using the same definition for “landslide.”
- They also developed a definition for the term, “unstable slope or slide-prone area,” and recommended that it be used in place of three separate, similar terms now used in the regulations.
- The S&TC provided a new definition for “unstable fill material.”
- The Committee also provided indicators for determining when “saturated soil conditions” exist on slopes. The existing definition for “saturated soils” in the FRPA regulations applies to muskegs as well as slopes, but the risk for landslides only occurs on slopes. There was some confusion about how wet a soil must be to qualify as saturated – it is different than just wet soils. The indicators are designed to help people readily identify saturated conditions in the field.

In general, the S&TC said that the BMPs did a reasonable job of addressing landslide risks. They recommended the following additions to further strengthen the BMPs.

- Direct operators to minimize disturbance to soils, understory vegetation, stumps, and root systems in cable-yarding operations.
- Direct operators to consider partial cuts, helicopter yarding, retention areas, or other techniques designed to minimize disturbance to soils, understory vegetation, stumps and root systems when planning harvest units on unstable slopes or slide-prone areas,
- Require prior notice to DOF for use of tracked or wheeled harvest systems on unstable slopes or slide-prone areas.
- Prohibit blasting during saturated soil conditions on steep slopes, unstable slopes, or slide-prone areas. The current regulations prohibit blasting under these conditions “if mass wasting is likely to result and cause degradation of surface or standing water quality.” The S&TC felt strongly that when soil is saturated on steep or unstable slopes, the likelihood of a large slide is very high, mobility of a slide is great, and the ability to predict the extent of the slide’s movement is limited. This change would mean an operator would have to wait for soils to dry out to a less than saturated condition before blasting.

The S&TC did not reach consensus on one issue – the threshold for requiring end-haul and full-bench road construction methods under 11 AAC 95.290(d). The current regulations require end-hauling and full-bench road construction if mass wasting is likely to occur “and cause degradation of surface or standing water quality” in 11 AAC 95.290(d). S&TC members disagreed on whether or not to delete the qualifying phrase (underlined above). They identified two options for this BMP.

Option A: Pat Palkovic (DOF), Greg Staunton (DOF), and Bert Burkhart (Columbia Helicopters) support this option. They believe that road construction issues are best addressed on a site-by-site basis, that end-haul/full-bench construction may also have landscape impacts, and that the existing and recommended BMPs provide the tools to address road proposals that have the potential to impact water quality or fish habitat.

Option B: Adelaide Johnson (USFS) and Kevin Hanley (DEC) support this option. They believe that extent of impacts from road construction on an unstable slope or slide-prone area is unpredictable, and that road construction in areas where mass wasting is likely to occur should require end-hauling and full-bench construction to minimize landslide potential.

Neutral: Kyle Moselle (ADF&G), Dennis Landwehr (USFS), and Jim Baichtal (USFS) were neutral. Moselle said that fish habitat would be protected under either option. Landwehr and Baichtal were indifferent with a slight preference for Option A. Landwehr stated that there would be little difference between the options in actual practice.

The S&TC also recommended training for agency staff, landowners, and operators on the following topics.

- Identification and mapping for DPOs of “unstable slopes and slide-prone areas,”
 - Information available from the scoping maps, digital elevation models, and other sources to identify and map these areas
 - All indicators listed under this definition
 - Which slopes <67% are unstable or slide-prone
- Identification of “saturated soils” and understanding of the indicators for saturation on slopes
- Assessment of likely runout zones for potential slides (e.g., see Chatwin et al., 1994 for illustrations)
- Connection between FRPA standards and water quality standards, and sources of information on water uses
- Any changes adopted in regulation or made to the DPO form.

If the Board approves the recommendations, including direction on the road construction issue, the next step would be to convene an Implementation Group to determine how to best implement the S&TC recommendations in a practical and effective manner. An Implementation Group would include representative of state resource agencies, forest landowners, operators, and affected interests. The S&TC recommendations do not require any statutory changes, but may mean regulatory updates. Any regulation changes would go through the standard public process for adopting regulations. Changes to the BMP implementation fieldbook and training needs are administrative tasks within DOF authority.

Ed Wood and Suzanne West, Mitkof Highway Homeowners’ Association (MHHA), commented by teleconference. Wood thanked the Board for the opportunity to call in. West said that she had been part of the MHHA since its inception. She appreciated the S&TC effort, but said that the proposed best management practices (BMPs) don’t address public safety issues. There are no fish streams on the Mental Health Trust land of concern to the MHHA. Trust land harvest operations would occur 150’ from their drinking water outtake. Debris from timber harvesting would wipe out streams. She appreciates the water quality and fish habitat work, but it has nothing to do with public safety. The outcome falls short of the needs.

Nichols said that the BMP for blasting under 11 AAC 95.290(b)(3) could allow small right-of-way shots without a risk to resources, or could decrease the amount of powder usable. He can see the proposed restriction on a larger rock pit under saturated conditions. For the BMP under 11 AAC 95.290(d) you should be careful you don’t make a bigger problem from end-hauling by overloading. It’s hard to find a place to put that material.

Wolfe recommended that the Board not get into specifics of the recommendations. He suggested sending the S&TC recommendations forward to an implementation group and getting their recommendations.

Nicolls asked whether public review would be required for regulations and other actions. Freeman explained that there is a very specific required process for adopting regulations. The process includes public and agency input and review by the Attorney General’s Office and the Lieutenant Governor.

West said that she heard the Board’s vote on the public safety question. She understands that the Board thinks it’s not important and we’re stuck with the status quo even though the Attorney General’s Office said that the Board could seek public safety authority. Maisch responded that the Board could seek

authority for public safety, but elected not to request new statutory authority to do so under FRPA. The Mental Health Trust land exchange may be the best option to get protection for public safety in the MHHA area. The Board will discuss how it wants to be involved in that process and Maisch welcomed West calling in for that discussion.

Rogers noted that FRPA also has jurisdiction for water quality issues, not just protection of fish streams. FRPA does apply where water use is important.

West asked whether the Board has been on the Mitkof Highway site. Maisch said that the Board hasn't been on site, but others working with the issues are familiar with it. West said that the size of the proposed harvest is so big it would affect existing water rights. Wood said that they have used the stream for drinking water since 1961. A small harvest unit above a house resulted in a reservoir silting in five times. Now it dries up in drought periods. Maisch asked whether Wood has water rights for the stream. Wood said yes, but noted that water rights only deal with water quantity, not quality.

Gilder commented that almost all waters in Alaska are designated for all water uses, and that the standards for the most stringent designated use apply. In most cases that is the drinking water standard, not fish habitat. Freeman noted that the S&TC recommendations on training include a need for training on the connection between FRPA and the state water quality standards.

Slenkamp stated that Petersburg can pass a local land use ordinance for the Mitkof Highway sites. This doesn't need to be a statewide issue. It is best addressed on a local platform.

West said that on Wrangell Island at Mile 8, silt appeared in showers due to water quality problems following timber harvest on a Mental Health Trust parcel. The proposed timber harvest at Mitkof is different than harvesting on Kupreanof – on Mitkof there are homes, the highway, and the Tye power corridor. The USFS doesn't cut on steep, slide-prone slopes above homes. Other areas occur throughout Southeast Alaska. The recommended BMPs are nice suggestions, but so far away from what we wanted.

Landslide Science & Technical Committee, cont.

Maisch summarized that the Board's preference is to have an implementation group work on the two options presented for end-hauling and full bench construction.

Nichols commented that there are options A and B, but the differences aren't overwhelming. The implementation group needs to look at them, and see on the ground what fits.

Maisch asked whether the S&TC looked at costs. Freeman said no, we expect an implementation group to do that. Wolfe said that the S&TC has been helpful. Their work product now needs to be reviewed in the context of regulations and law. McLarnon agreed that it needs to move to the next committee. She said she doesn't have enough experience to weigh in on option A or B.

Freeman welcomed Board input on implementation group members. It would include landowners, operators, and other affected interests.

Nicolls said we need to be cautious about redoing what the S&TC has done. It is a wonderful product; we don't need to redo it.

Nichols suggested that since one BMP deals with blasting, it would be good to have a powder company representative involved.

Maisch said that he hears that the Board recommends convening an implementation group. I should include water expertise.

Wolfe reiterated that he appreciates the S&TC product, but it needs to be reviewed in total for implementation. The implementation group shouldn't be restricted to options A and B. Freeman said that implementation groups work best when they understand the goal, but can identify a better way to achieve it on the ground. Nichols said he is looking for a way to leave flexibility for operators while protecting the resources. Nicolls asked for clarification – is another committee review recommended, or just the implementation group. Maisch replied that the implementation group will review and bring a final recommendation to the Board. Nichols said that the issues are on steep slopes and saturated soil conditions, and we need to find people who understand that on the ground – we may need a geologist/hydrologist. In some places, soils may be so shallow that slides are not an issue. Freeman noted that we can bring in technical advisors as well as having people on the group. Wolfe said that it could be useful for powder information to bring in technical advice for a meeting. Nichols said he understands, but emphasized that there's a lot of blasting done near buildings in Southeast.

► Foley moved and McLarnon seconded a resolution to convene an implementation group. The motion passed unanimously.

Cronin said that he would like a summary of the Board's statement on the public safety issue. There must be a general position that if the state takes an action, there is a concern for public safety.

Freeman recapped the Board's decision on public safety. The Board felt that many authorities address public safety, many activities cause slides, and slides occur both naturally and from human activity. Other authorities, particularly local planning and zoning under Title 29 are better suited to address these issues. McLarnon added that the scoping process identified safety hazards from slides on a small percentage of the area. The issue is localized and doesn't merit a change in the statewide statute. Maisch reiterated the Board's position that local processes are more appropriate to the scale of the issue. Fish habitat and water quality BMPs also provide some protection for public safety.

Hanley commented that the non-consensus on Options A and B reflects some difference of opinion on how well the fish habitat and water quality BMPs address the public safety issues.

Nicolls feels bad that we can't do more to respond to the local concern – he wishes there were an overarching state policy response. We know there are various hazards next to communities. Nichols commented that the comfort is the amount of research the group has done. Safety is a human emotion issue. Any changes to the land can trigger problems, and it's hard to identify what are the results of human activities and acts of God, especially 5-10 years after completion. Where does liability end? It's an ongoing battle – the potential is always there.

Maisch observed that we are trying to manage risk, and different people are comfortable with different levels of risk. Fire management is similar. Cronin asked whether safety issues ever come up in other forestry arenas, for example with forest management in spruce bark beetle areas. Maisch said yes. DOF was sued on both sides with respect to beetles -- for doing too much and doing too little. DOF won both cases. The court ruled that DOF used a good process to decide, and had discretion to make the decisions. The agencies need to use best professional judgment on the ground.

Cronin said that with landslides, there is FRPA oversight of the activity. The Division would look at the site for risk. Maisch replied that DOF's role is to provide sound professional guidance on how to use BMPs to minimize risk, and operators and landowners have to implement the practices. Wolfe emphasized that FRPA is not a permit, it is a notification system. There aren't "practices acts" for other

developments activities like subdivisions. This isn't the only body of state law, and other bodies of law are more important for this issue.

Moselle commented that the S&TC recognized that these issues are at the crossroad of policy and science. One of issues the Committee discussed was whether we are trying to write regulations to prevent all landslides, or manage risk. There will be natural slides and small shallow slides with limited impacts. The implementation group should start with the S&TC minutes and understand that deliberation. On blasting we said you should avoid it completely when soils are saturated, but allow more risk with road-building. The S&TC moved forward with Options A and B – one requires end-hauling, one only requires it when the risk of water impacts high. The implementation group needs to get into those discussions.

Nichols observed that on blasting it's a no-go or go call, but only for a time window. Requiring end-hauling is costly but can be beneficial. Blasting is a timing issue.

Vinsel asked if there was a previous discussion of water issues on MHHA site. Freeman said yes. The agencies knew there were streams, but they are not fish habitat streams. Hanley commented on the water issues in his comments on the DPO. Nichols added that the S&TC identified road-building as the big issue, and there wasn't road-building on the Mental Health Trust harvest proposal on Mitkof. Hanley said the agencies received letters from homeowners about water concerns on Mitkof. Even before that DEC assumed that there was downslope use of water and recommended mitigation measures to prevent impacts to water quality.

The Board of Forestry endorsed sending thank you notes to the S&TC members for their work on landslide issues.

Attendance

William Ashton, DEC
Allen Brackley, speaker
Clarence Clark, DOF
Ross Coen, UAF
Mark Eliot, DOF, speaker
Deputy Commissioner Ed Fogels, DNR
Chris Foley, DEC
Marty Freeman, DOF, speaker
Cindy Gilder, DEC
Kevin Hanley, DEC
Doug Hanson, DOF
Dave Harris, USFS
Kerry Howard, ADF&G, speaker, (by teleconference)
Patricia Joyner, DOF, speaker
Kyle Moselle, ADF&G

Pat Palkovic, DOF (by teleconference)
Devany Plentovich, AEA, speaker
Will Putman, Tanana Chiefs Conference
KT Pyne, DOF (by teleconference)
Rick Rogers, DOF, speaker
Kevin Saxby, speaker
Jim Schwarber, DOF, speaker (by teleconference)
Paul Slenkamp, AMHT, speaker
Greg Staunton, DOF (by teleconference)
Commissioner Dan Sullivan, DNR
Suzanne West, Mitkof Highway Homeowners Assn. (by teleconference)
Ed Wood, Mitkof Highway Homeowners Assn. (by teleconference)



MINUTES
Board of Forestry Meeting
Monday, January 31, 2011

Teleconference to: Anchorage, Juneau, Fairbanks, Ketchikan, and Petersburg, Alaska

Call to Order and Roll Call. Chairman Maisch called the meeting to order from Fairbanks at 1:10 p.m. Juneau, Anchorage, Ketchikan, and Petersburg teleconference sites were connected. All board members were present by teleconference: Rob Bosworth (Juneau), Jeff Foley (Anchorage), Erin McLarnon, Matt Cronin (out-of-state), Mark Vinsel (Juneau), Ron Wolfe (Juneau), and Eric Nichols (Ketchikan).

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

Public comments

- Buck Lindekugel, Southeast Alaska Conservation Coalition (SEACC) attorney, spoke in support of House bills 97 and 91. He said that protecting infrastructure is key, and FRPA doesn't do a sufficient job. Regarding SB44/HB105, his main concern is that logging is the main priority for the Southeast State Forest; community use is secondary. That creates an imbalance. Alternatives could be to balance the State Forest additions with state parks or to remove parcels with important fish and wildlife habitat from the bill. The Hook Arm and Rowan Bay parcels are of particular concern – all of the Hook Arm parcel and 80% of the Rowan Bay parcel is old growth. Those parcels are remote and timber will be exported which exports jobs and fish and wildlife resources supported by the old growth habitat. Alaska statutes require a report with a preliminary forest inventory for State Forest proposals. The DNR briefing packet only includes parcel acreage – Lindekugel had to go to other sources for more information. Regarding the public notice for the Board meeting, the Public Service Announcement didn't include the call-in number – people couldn't attend if they were not at one of the official meeting sites.

Freeman noted that several people called the information number provided and were given a call-in number if they couldn't attend one of the sites.

- Dave Beebe from Petersburg spoke as an individual in support of HB91. He asked the Board to reconsider deferring landslide zoning to municipalities. The municipalities don't have the necessary expertise to judge these hazards for themselves. Alaska is conspicuous for being among the last western states to have a forest practices standard for harvest on unstable slopes that could be a threat to public safety. The Board has the authority and stands as the gatekeeper to protecting public safety with respect to timber harvest on unstable slopes.
- Suzanne West and Ed Wood from Petersburg spoke as individuals in support of HB91. They read and submitted the following comments. Their comments are quoted as read (*see handout*).

“HB 91 is the direct result of the December 12, 2005 Trust Land Office planned timber harvest in Petersburg in a well-documented landslide area.”

“It is also the direct result of three years of Board of Forestry meetings in which public safety related to logging in steep, unstable, inhabited forested areas was the topic of discussion. The Board of Forestry even formed their Landslide Science & Technical Committee to scope out and map unstable areas, inhabited or accessible to the public across Alaska; and to update their Best Management Practices related to fish habitat and water quality

y.”

“As per the Board of Forestry Minutes for February 12-13, 2008, on Page 9, questions raised at the October 9, 2007 Board meeting included: “Question No. 2: Can a consideration of public safety be added to the Act or regulations?” Per consultation with the Attorney General’s Office, adding standards for public safety would require a statutory change to the Forest Resources & Practices Act. Regulations on public safety could not be adopted without a change to the Act.”

“As per the Board of Forestry Minutes for March 17-18, 2010, the Minutes read: “DOF consulted with the Attorney General’s office, who advised us that public safety could be added to one section of the FRPA, e.g., AS 41.17.060(B) (5) without requiring that public safety be considered under the Act’s other provisions.”

“The final result of all of this time and effort was that the Board abdicated its responsibilities to the public and its authority to manage timber harvests within inhabited areas to local zoning ordinances. As a result, Alaska’s citizens wrote a bill amending AS 41.17.060(B) (5) to include public safety provisions for those inhabitants living or transiting through Alaska’s steep and unstable forested regions, which Representative Peggy Wilson found credible enough to sponsor and introduce.”

“And oh, by the way, there is still no Trust land exchange. They announced at their October 28, 2010 Resource Management Committee meeting a forthcoming five-year timber harvest plan which includes the land exchange parcels, so the need for legislation addressing “public safety” will be as pertinent now as when this entire process began.”

“I support House Bill 91.”

- Scott Hahn, Petersburg city manager reported that Petersburg is close to forming a borough, and is concerned about how SB 105/HB44 will affect the amount and quality of land available for future borough land selections. Regarding HB91, he said that the Petersburg City Council has supported efforts to provide safety on high-sloped areas. He will have to learn more about the new section 6 [addition to AS 41.17.060(b)], but other sections seem in line with what the city council would support.
- Paul Slenkamp, Forester for the Alaska Mental Health Trust, spoke in opposition to HB91. The Board spent 2-1/2 years working through this issue and had the support of the Mitkof Highway Homeowners Association until recently. The bill has some inconsistencies like the 45% grade standard and restrictions within ½-mile of roads. There is no provision for what happens if there are conflicting geologist reports as occurred with the Mental Health Trust parcels on Mitkof Island. There is no ability for on-site inspections a half-mile from the roads. This bill would raise operating costs which conflicts with FRPA requirements to consider economics. This bill would be a taking and could negatively affect a land exchange which the Trust is continuing to try to make happen.
- Maisch read a letter from Larry Mayo into the record (*see handout*): Regarding HB91, the wording in Section 1(b) should be expanded to include “businesses, public facilities, roads, and private residences” to define “human habitation”. He has studied Doug Swanston’s research and supports his findings.

Matt Cronin signed off

2011 legislation

Public safety and FRPA (HB 91). Maisch noted that the Board is familiar with the process that we've used to consider this issue.

Freeman provided an overview of the bill. HB 91 would add three new subsections to FRPA in AS 41.17.060(b). All provisions of the bill would apply to state, municipal, private, and trust-owned forest land. The additions would:

- Require that “threats to public safety” within ½-mile of a public road or adjacent to human habitation be prevented or minimized;
- Require DNR to set “strict safety standards” for timber operations on slopes >45% near human habitation, and lists specific factors to consider in developing the standards; and
- Require that DOF notify “affected property owners” and “local governing bodies” of potential hazards of timber operations on slopes >45%.

DNR is reviewing the bill in consultation with the Attorney General's Office. DNR recognizes that there has been a long process to assess the extent of public safety issues and landslides with a Science & Technical Committee, and that the Board has discussed public safety and landslide issues at 10 meetings over the last three years. In addition to the issues raised in those discussions, DNR notes that a number of terms in the bill are vague and would need to be defined in regulation, including “threats to public safety,” “affected property owners,” “in or near,” and “local governing bodies.” What level of threat is addressed, and are there threats to public safety other than landslides that the bill intends to cover? Do “local governing bodies” address entities other than municipalities? DNR also notes that the slope standard in the bill differs from that recommended by the S&TC.

The department also notes that language in the bill interacts with several other sections of FRPA dealing with “public resources” in ways that may require clarification through the courts. These include:

- AS 41.17.080(d) requires that DNR avoid adopting regulations that “increase operation costs without yielding significant benefits to *public resources*.”
- The FRPA process is not a permit process. Instead, it requires agency review of a Detailed Plan of Operations (DPO) on private, municipal, and trust land. Under this process operations may proceed 30 days after submittal of a DPO unless DNR issues a stop work order. (AS 41.17.090(e)). A stop work order may only be issued for activities that would violate FRPA or its regulations *and* if significant harm to *public resources* is likely to occur if work is not halted. Also, the provision to notify landowners of “threats to public safety” is a different notice process than the DPO process in terms of who is notified, and what analysis is required by agencies. It might necessitate contracting or geotechnical experts to do this analysis, and could affect timelines for DPO review.
- AS 41.17.900(b) says that the degree of *resource protection* on federal land may not be less than that for state land.

Maisch said that the Division will develop an internal paper for the Commissioner's review and discussion with the Attorney General's Office. DNR hasn't taken a position on the bill yet, but Maisch expects that there will be a DNR position in the future.

McLarnon asked about the bill's status. Freeman said that it has been referred to the House Resources and Finance committees; no hearing is scheduled yet in the House Resources Committee. Nichols asked whether there is any expectation of a companion bill in the Senate. Maisch said that none is known. Lindekugel said he is not aware of HB91 being introduced in Senate.

Wood asked for a copy of Freeman's presentation. Maisch said that the Division will send him the minutes.

Wolfe said that at the next Board meeting, the state may have a position on this bill. He expressed grave concern over the bill -- it flies in the face of the state FRPA process since 1990. This is a complete breach of what we've worked at for 20 years.

Freeman noted that DNR put together a timeline of the process and will provide it to the Commissioner's Office.

Nichols asked whether DNR wants a position from the Board. Maisch said that we don't expect that today, but welcome Board input. Nichols asked whether a Board position on the bill can be put on the agenda for the March-April meeting. Maisch said that it certainly can.

Foley recollected that the Board has never been comfortable assuming responsibility for public safety under FRPA. Rather, the FRPA authority isn't consistent with including public safety. He recognizes the concerns of those supporting the bill, but only if this bill moved forward would the Board be required to offer an opinion. Based on Freeman's comments, he doesn't see how the Legislature could pass a bill without a lot more work, and doesn't see the need to provide an opinion on the bill at this time.

Nichols stated that Wilson's bill also raises questions on DNR's ability to regulate this. Maisch agreed, and noted that the Attorney General's Office is also looking at questions raised by the bill.

Wolfe had to leave, and said he appreciated the meeting.

Attendance

Petersburg

Dave Beebe, (traveling)
Scott Hahn, Petersburg City Manager
Dave Holmes
Matt Liechtenstein, KFSK
Nancy Strand, Petersburg City Council
Suzanne West
Ed Wood

Anchorage

Thomas Deerfield, Dalson Energy
Marty Freeman, DNR Division of Forestry
Gino Graziano, DNR Division of Agriculture
Devany Plentovich, AEA
Rick Rogers, DNR Division of Forestry

Fairbanks

Mark Eliot, DNR Division of Forestry

Juneau

Kevin Hanley, DEC
Brian Kleinhenz, Sealaska
Buck Lindekugel, Sealaska
Kyle Moselle, ADF&G
Joel Nudelman, DNR Division of Forestry
Jason Oakley
Pamalyn Duvall, Office of Rep. Wilson

Ketchikan

Clarence Clark, DNR Division of Forestry
Mike Curran, DNR Division of Forestry
Larry Jackson, Tongass Forest Enterprises
Pat Palkovic, DNR Division of Forestry
Alan Rockwood
Paul Slenkamp, Alaska Mental Health Trust
Greg Staunton, DNR Division of Forestry
Wayne Weihing

Metlakatla

Janelle Winter, Metlakatla



MINUTES
Board of Forestry Meeting
Thursday-Friday, March 31-April 1, 2011
DEC Conference Room, Juneau, Alaska

Call to Order and Roll Call. Chairman Chris Maisch called the meeting to order at 8:10 a.m. The Anchorage teleconference site was connected. Rob Bosworth, Jeff Foley, Erin McLarnon, Matt Cronin, Mark Vinsel, Ron Wolfe, and Eric Nichols were present. Wayne Nicolls was absent due to illness. Ed Wood teleconferenced in from Petersburg.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

Landslide Implementation Group. Marty Freeman, DNR Division of Forestry (DOF), reported that she has been working on identifying members for the group, including follow-up discussions with a number of Board members after comments at the last meeting. The goal is to find individuals who can

- represent the different interests who may be affected by recommended changes to FRPA best management practices or other actions to address landslide impacts;
- communicate with others with similar interests,
- listen to other points of view, and
- help develop consensus recommendations.

Affected interests for this issue include agencies responsible for implementing FRPA, municipalities, forest landowners, timber operators, water users (including homeowners), and fisheries interests. The following people have been identified for Implementation Group participation so far:

FRPA Agencies:	Greg Staunton/Pat Palkovic, DNR Division of Forestry Kevin Hanley, DEC Division of Water Kyle Moselle, ADF&G Habitat Division
Forest Landowners:	Ron Wolfe, Sealaska Paul Slenkamp, Mental Health Trust ANCSA Village Corporation – TBA
Municipalities:	TBA (will be chosen from municipalities with potential hazards in their boundaries based on scoping)
Water Users:	TBA (Mitkof Highway Homeowners have been invited to participate, but have not yet decided whether to do so; watershed councils are potential candidates)
Timber operators:	TBA (want to include expertise in ground and helicopter operations and road-building)
Fisheries:	Mark Vinsel, United Fishermen of Alaska Mark Kaelke, Trout Unlimited

Freeman wants to make sure that the mix of municipalities, village corporations, and possibly watershed councils also has geographic diversity.

Vinsel suggested that hatchery operators might be a good source of knowledge on water resources.

Wolfe said that he hasn't yet contacted village corporations regarding potential candidates, but will do so.

Freeman has updated the mailing list with 129 names, including 30 contacts with organizations/businesses, 30 with Native corporations, 19 municipalities, 28 state and federal agencies, eight legislators, two media contacts, and 12 individuals. An initial announcement about the Implementation Group process and minutes of all Group meetings will be sent to everyone on the mailing list. Please let Freeman know if there are any additions to the list. All Implementation Group meetings will be open to the public.

The target is to hold initial Implementation Group meetings in May, and have recommendations for the summer Board meeting. This depends in part on the timing of the summer meeting and availability of staff and members over the summer.

Wolfe expressed concern about the make-up of the Implementation Group. The Group is charged with implementing the scientific recommendations within the FRPA structure. Members need to be familiar with FRPA. He is also concerned that there is a separation of the science concerns and the Implementation Group considerations. Freeman said that the membership is similar to that from past BOF processes. State agency representatives bring both technical knowledge and familiarity with implementing FRPA. Wolfe acknowledged that this is somewhat a hybrid – the format has changed some over time. Freeman added that implementation groups are briefed on FRPA, including the original Green Book principles.

Attendance

William Ashton, DEC, Division of Water
Clarence Clark, DNR Division of Forestry
Thomas Deerfield, Dalson Energy
Mark Eliot, DNR Division of Forestry
Marty Freeman, DNR Division of Forestry
Mike Goldstein, Alaska Coastal Rainforest Center
Gino Graziano, DNR Division of Agriculture
Kevin Hanley, DEC Division of Water
Dave Harris, USFS Director of FM
Brian Kleinhenz, Sealaska
Tom Kurth, DOF Fire Management Program

Ruth Monahan, USFS Region 10
Kyle Moselle, ADF&G
Joel Nudelman, DNR Division of Forestry
Beth Pendleton, USFS Region 10 (3/31 only)
Devany Plentovich, AEA
Rick Rogers, DNR Division of Forestry
Jim Schwarber, DNR Division of Forestry
Paul Slenkamp, Alaska Mental Health Trust
Nancy Sonafrank, DEC Water Division (Fairbanks)
Jackie Timothy, ADF&G
Ed Wood, Mitkof Highway Homeowners Assn.



MINUTES
Board of Forestry Meeting
Tuesday-Wednesday, August 30-31, 2011
DOF Conference Room, Palmer, Alaska

Wednesday, August 31, 2011

Call to Order and Roll Call. Chairman Chris Maisch called the meeting to order from Fairbanks at 8:10 a.m. The Anchorage teleconference site was connected. Rob Bosworth, Jeff Foley, Erin McLarnon, Matt Cronin, Mark Vinsel, Ron Wolfe, Wayne Nicolls, and Eric Nichols were present.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

Landslide Standards Implementation Group (“Group”). Freeman reported that the Group has met twice, and reviewed nine of the 10 consensus points from the Science & Technical Committee (*see handout on status of consensus points*). (S&TC) They are scheduled to meet again September 27 to review the final consensus point, the one non-consensus item from the S&TC, and do an overview of the complete package.

The Group endorsed most of the S&TC consensus points, with minor changes for clarification. They split the term “unstable slope or slide-prone area” into two terms: “unstable area” for use in the Detailed Plan of Operations (DPO) regulations under 11 AAC 95.220, and “unstable slope” for the other BMPs. The indicators developed by the S&TC would be included in the definition for “unstable area” in the regulations under .220. The Group did not reach consensus on whether to include the indicators with a definition of “unstable slope” in the regulations or add them to the BMP implementation field book (“purple book”).

The Group did not reach agreement on the S&TC Consensus 8 which recommending the following deletion:

“(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...] (3) may not conduct excavation and blasting activities during saturated soil conditions, [IF MASS WASTING IS LIKELY TO RESULT AND CAUSE DEGRADATION OF SURFACE OR STANDING WATER QUALITY.]”

The Board discussed the non-consensus issue from the Group. Wolfe said that the water quality threat is covered if a slide is likely to occur and cause degradation. Hanley countered that under these conditions slides are highly likely and the extent of slides under these conditions is unpredictable. Vinsel said that the term “likely” is undefined. Nichols didn’t agree that slides are likely – the construction could be on a short sidehill stretch above a bench. The question is whether there are ways to operate rather than prohibiting operations. Putting material over the side is what causes problems. Short sidehills are common. Leave the modifying phrase in.

Suzanne West from Petersburg said the Mitkof Highway Homeowners Association (MHHA) concerns started in December 2005 with the Mental Health Trust harvest proposal. There was a general consensus amongst locals that it would be dumb to log this area because of the landslides that have crossed Mitkof Highway. She reported that in December 2005, Pat Palkovic from DOF said “there wasn’t anything she could do because public safety wasn’t included under FRPA authority”. In September 2007, MHHA asked the Board to amend FRPA to include public safety authority for timber harvest on steep and unstable slopes throughout Alaska. The steep and unstable Mitkof Highway hillside doesn’t have a fish stream. The MHHA declined to participate in the Implementation Group because it is a detour away from their public safety issue. They support the HB 91 approach instead. She, on behalf of Ed Wood, asked what “water quality” means under FRPA, because their water rights stream's water quality has been affected by a prior clear-cut timber harvest.

Nichols asked what happens if there is no consensus from the Implementation Group. Freeman said that the Group looks to the Board for direction.

Wolfe stated that there are four issues with two policy calls unresolved with the Implementation Group. The first is the link to degradation of water quality in 11 AAC 95.290 (Road Construction). The Group needs Board direction. The second issue is where the indicators for reside regarding “unstable slopes.”

Wolfe is not in favor of removing the phrase “if mass wasting is likely to result and cause degradation of surface or standing water quality.” This language is a foundation to the FRPA. Called attention to AS

41.17.060(b)(5) re preventing or minimize adverse impacts to fish habitat or water quality – that’s the statutory direction re mass wasting. Also, AS 41.17.080(d) state that for FRPA, the Commissioner shall avoid regulations that increase operating costs without significant benefits to public resources. If you are going to take away the link to water quality in the regulation, it’s in conflict with the statute. The non-consensus item on .290(d) raises the same issue. On private land we’re not against mass wasting, we’re against mass wasting that causes degradation of water quality.

Nichols emphasized that FRPA is all about protecting public resources. If we make changes like this, then people will come and start complaining about things like viewsheds. Freeman noted that other BMPS don’t have this caveat. Wolfe said that the phrase was inserted where there are costly measures attached. Bosworth supported the language in the current BMP. Nichols said that degradation is a broad term. You’re not asking for a change in how people look at things, it’s just a question of what we’re trying to protect. Any time you run a risk of a slide you run a risk to water quality.

Hanley described a slide into marine water at South Cholmondeley. It dumped a lot of debris in marine waters following blasting in saturated conditions. Imagine if the same thing happened in a residential area.

Moselle said that these two regulations (11 AAC 95.290 (b)(3) and (d)) are some of the most important that the S&TC and Implementation Group have been weighing. It is useful to note that one had consensus – blasting and excavation on saturated soils [(b)(3)] – but not the other on end-hauling and full-bench construction [(d)]. The S&TC felt that with saturated conditions, every pore is filled with water and the hillside is connected to the water throughout the area – you’re already working in a degraded water quality condition. Enforceability is an issue. He does understand Wolfe’s point. Also, saturation is a temporary condition – the operator just has to wait while the soils drain, then go about blasting. End-hauling is different – it creates a permanent condition, and Moselle said he can see that removing the “likely to result” condition does put an economic onus on the landowner.

Nicolls said he cannot tell why the S&TC wants to drop the phrase. Freeman explained that the S&TC felt that with the combination of steep or unstable slopes, saturation, and blasting or excavation, slides would occur and the conditions of damage to water quality would be met. Nicolls asked, “Why not drop that phrase?” He said if you don’t have to say it, don’t say it. Wolfe countered that if degradation to water quality is likely to occur then this BMP will apply. He is not willing to assume that degradation will always occur. He doesn’t want to cause a landowner to do something costly if no public resource is protected.

Cronin said if you are excavating under these conditions and have mass wasting and there’s 100% chance of degradation, that’s one thing, but you don’t ever have 100% chance. Leave the phrase in because it’s not worth arguing about. McLarnon said she doesn’t see an issue with it being there. Nichols said operators often are just putting shallow holes for a ditchline on the inside of the road with a shallow blast. It’s hard to envision everything that happens in a construction zone.

► The Board unanimously recommends leaving the language in place. The Group can continue its discussions, and if they have compelling information to share with the Board they can do that.

Wolfe noted that there is also an issue on where the indicators reside for “unstable slope.” Freeman said that the indicators for “saturated soils” haven’t yet been discussed by the Group. Jandreau said that the field foresters use the regulations for definitions. The purple book is used when doing the compliance monitoring. Operators in Southeast may use the purple book more.

Nichols cautioned that putting a list like this in regulation means that if something else comes up that should be added you have to go through the regulation process to do that. We look for landslide

indicators on the ground – operators don't want to put in a road that will slip. Specific indicators may or may not be present. Vinsel said that regulations can be easily updated; it is statutes that are difficult to change.

Bosworth stated that it is reasonable for regulations to define indicators. We can advance this with the Implementation Group by supporting including them in regulations. Wolfe opposes them in regulations because we're going to have to define terms in the indicators. The decision needs to be made on the ground. The more decisions are removed from the ground the more it flies in the face of FRPA. This doesn't need to be in regulation when it hasn't proved to be a problem in practice. There haven't been a lot of mass wasting issues that have turned into problems. Bosworth said he doesn't disagree; regulations can be pretty strong. Wolfe stated that within the FRPA structure, we have the statute which is the most difficult to change; regulations which are easier but have a formal process; or the purple book which used to be the field manual which is designed to provide more information on what we mean by indicators. If the indicators are used for a protracted period and they hold up, then they could be moved to regulations, but that would be a mistake at this point. Vinsel said he has been swayed by the information that operators don't use the purple book that much. You can't put something back after it occurs. The regulations are our best management practices. We don't have another level that is likely to be seen. We want these things known and understood by people on the ground.

Wolfe said that in Region I, Bob Girt said he goes to the purple book. Operators do use the implementation manual. Moselle noted that the Implementation Group changed "unstable slope or slide-prone area" and pared it down to "unstable slope." The indicators are included in regulation for .220. They aren't applied to the BMPs, but the intent of using these in identifying areas in the DPOs is there. Cronin reminded the Board that we're getting into mission creep. Now we're bringing in the issue of mass wasting more generally. Freeman noted that these issues, including the need for these definitions, were included in the initial DOF white paper as gaps in the regulations. Nichols said that the emphasis needs to be on training and prevention in the planning stage.

Wolfe said that the DPO section in 11 AAC 95.220 includes the indicators for identifying areas of potential concern. The indicators are guidance that an operator should consider, and should be used in training, not in the specific indicators. Moselle concurred. Nichols noted that the DPO already has a box to check for "unstable slopes."

Maisch recommended further Implementation Group discussion on this issue.

Hanley noted that Suzanne West referred to source water protection requirements which don't cover their individual water supplies. West explained that Ed Wood asked what "water quality" means. His water rights don't seem to matter when affected by logging. Hanley clarified that for FRPA, private water is covered under the definition of "surface water;" public water sources have additional protections under DEC regulations. Freeman emphasized that there's no distinction under FRPA between types of drinking water sources. Gilder clarified that the most stringent water quality standard attached to a designated water use are the standards that apply to any give water body.

Attendance

Ken Bullman, DOF
Clarence Clark, DOF
Mark Eliot, DOF
Chris Foley, DEC
Marty Freeman, DOF
Cindy Gilder, DEC
Jeff Graham, DOF
Kevin Hanley, DEC

Dave Harris, USFS
Bob Jones, BLM
Kyle Moselle, ADF&G
Gary Olson, Alaska Moose Federation
Warren Olson
Devany Plentovich, AEA
Rick Rogers, DOF
Jim Schwarber, DOF, (Fairbanks
teleconference)

Paul Slenkamp, Alaska Mental Health Trust
Jon Tillinghast, Sealaska attorney (Juneau
teleconference)

Suzanne West, Mitkof Highway Homeowners
Assn.
KT Pyne, DOF (Fairbanks teleconference)



MINUTES
Board of Forestry Meeting
Tuesday-Wednesday, November 29-30, 2011
DNR Large Conference Room, 3700 Airport Way, Fairbanks, AK

Tuesday, November 29, 2011

Call to Order and Roll Call. Chairman Chris Maisch called the meeting to order at 8:35 a.m. The Anchorage and Juneau teleconference sites were connected. Rob Bosworth, Jeff Foley, Erin McLarnon, Mark Vinsel, Ron Wolfe, Wayne Nicolls, and Eric Nichols were present and a quorum was established. Matt Cronin was absent.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

Landslide Implementation Group. Marty Freeman, DOF, summarized the Implementation Group (IG) process and recommendations (*see handouts*). The IG met three times to review the recommendations from the Science & Technical Committee (S&TC), consider economic and land ownership factors, and determine how to best implement the S&TC recommendations in practical manner.

The Group agreed on the following terms:

- Landslide and mass wasting will both use the existing mass wasting definition in the regulations.
- “Unstable area” and indicators for unstable areas will be used in the regulation section on DPOs (11 AAC 95.220)
- “Unstable slope” will be used in all other BMPs that previously used the terms “unstable slope,” “unstable or slide-prone slope,” or “unstable slope or slide-prone area.” These include the BMPs on road construction (11 AAC 95.290), harvest unit planning and design (.340), landings (.345), cable yarding (.360), and tracked and wheeled harvest systems (.365). A new definition of “unstable slope” will be added to the regulatory definitions.
- Add a definition for “unstable fill material” to the regulatory definitions and using the new term in the BMP on balancing cuts and fills in road construction (11 AAC 95.290(b)(2))
- Leave “high risk of slope failure” as is in 11 AAC 95.280(d)(1) under slope stability standards.

The Group agreed on the following changes to BMPs:

- Add a new subsection to the cable yarding BMPs (11 AAC 95.360) requiring that operators minimize disturbance to soils, understory vegetation, stumps, and root systems.
- Add a new subsection to the harvest planning BMPs (11 AAC 95.340) requiring that operators consider techniques such as partial cuts, retention areas, and helicopter or skyline yarding to minimize disturbance.
- Add to the tracked and wheeled harvesting BMPs (11 ACC 95.365) a requirement that an operator provide notice to DOF before operating tracked or wheeled equipment on unstable slopes.

The Group recommended training on DPO mapping and identification of “unstable areas;” use of the indicators to identify unstable slopes, unstable areas, and saturated soils; assessment of slide runout zones, the connection between FRPA standards and DEC water quality standards, use of the BMP implementation field book (“purple book”), and changes to the BMPs.

The Group deferred to the Board’s decision to retain the qualification that restrictions to blasting and excavation under saturated soil conditions (11 AAC 95.290(b)(3)) and end-hauling and full-bench construction (11 AAC 95.290(d)) be limited to conditions where mass wasting “is likely to occur and cause degradation of surface or standing water quality.”

The Group did not agree on whether to include the indicators for “saturated soils” and “unstable slope” in the regulations or the BMP implementation field book (“purple book”). Next steps may include conducting the regulation process, training programs, updates to the “purple book,” and other actions depending on BOF decisions.

Board input is needed on the location of indicators for unstable slopes and for saturated soils, on putting the IG recommendations into regulations, and on the overall “Option II” approach.

Wolfe noted that many of the current regulations came from a prior field book. Freeman noted that some new regulations have been adopted as a result of the S&TC/IG processes. Nichols asked whether there will be any better indicators in the future. The proposed indicators have largely been around for awhile and are pretty straightforward. They don’t identify all problem areas. Would putting these in regulation make it harder to look at new information as it comes along? Hanley noted that the recommendation is to consider these, and use “may include” language, not to preclude consideration of other factors. Maisch noted that the regulation process is simpler than legislation, and regulations can be revised in the future.

Wolfe advocated putting the indicators in the purple book. There’s a conflict between a guideline and an indicator. Regulations aren’t guidelines. It is inappropriate to have the indicators in regulations when they are connected to specific regulations that could be costly. Hanley responded that the regulations are specific regarding characteristics for anadromous streams but anadromous fish are often found outside Type A and B streams – there are still instances that go beyond the guidelines. Wolfe disagreed; he said the regulations are clear on what to do when anadromous fish are found outside catalogued streams. Nicolls stated that the cost should not be part of the consideration for the location of the indicators. Wolfe countered that cost is one of the cornerstones of FRPA since 1990. Vinsel added that the difference between the IG and S&TC is that the IG includes considerations of economic factors. Maisch said the FRPA approach is to seek a dollar’s worth of protection for a dollar’s worth of cost, especially on private lands.

Maisch noted that a recent letter from the MHHA raised some issues for the Board. He noted that the Board is an advisory board to the state agencies, not a regulatory board. Discretionary immunity applies to the Board as a whole and as individual members as long as they are not grossly negligent.

Kevin Saxby, Assistant Attorney General, said that there are two statutory levels of protection for Board members.

- 1) If a lawsuit is brought, and the Department of Law finds that the person charged was acting in their official authority, the state will provide the defense, and it becomes a suit against the state rather than against the individual.
- 2) There is a prohibition against lawsuits on policy-level discussions and decisions.

There is a great deal of protection to allow the Board to do their jobs.

Nichols stated that the MHHA letter has an implied threat of individually naming Board members in lawsuits against Board actions. Some Board representatives might be perceived as having a conflict of interest –would they still be protected? Saxby answered that anyone can file a lawsuit, but it may not go anywhere. A Board members acting in his/her capacity as a Board member is protected. If a suit names an individual, the Department of Law reviews the case, and if the person was acting in their official capacity it automatically becomes a suit against the state and there is no personal liability. The second line of defense is that it's a policy level decision and a suit on that kind of decision is not lawful. The state would move to dismiss such a case for failure to state a claim. It is an unlikely as a case can be that a Board member would be personally liable for a recommendation on whether or not to adopt a particular regulation.

Cronin asked whether a landowner with timber like the Trust's at Mitkof has to have a plan approved by DOF. Maisch explained that the agencies must review the DPO, but it is not a permit. Cronin said that DOF could stop an operator if they proposed to cut down to a stream. Maisch said yes. DOF doesn't have the authority to adopt regulations on public safety at present, but can adopt regulations for water quality and fish habitat. Those regulations may have side benefits for public safety. Cronin asked who does have responsibility for public safety. Maisch said that in this case it would probably be local zoning. The Board reviewed public safety authorities in detail with the Board previously (*see minutes from March 17-18, 2010 Board meeting*).

Vinsel asked whether the Board would be acting outside its responsibility if members inserted themselves into a particular situation such that a landowner felt we were taking from their property to benefit a different landowner when the Board doesn't have public safety authority. Would Board members be liable in that case? Saxby replied that the analysis is the same regarding liability. The question is whether or not it would be legal. Legal issues would arise when the Dept. of Law reviews draft regulations for legality before they are published. The regulation attorney would determine whether there is legal authority to adopt the regulation. If not, it wouldn't go forward.

A Board member noted that the S&TC and IG input provides good forestry information. Where do we direct these citizens go who are asking for help? Maisch said that the Board's previous recommendation was that it was a local government issue. He noted that the City of Petersburg also discussed the landslide safety issue on Mitkof Island previously and did not reach agreement on how to approach it. Jandreau noted that there are some residences that are not in organized municipalities. Maisch agreed, although the Mitkof area is in a municipality. Other examples of municipal safety ordinances address floodplains and avalanche zones. Nichols added ordinances on fire risk. Slenkamp emphasized that there has been no activity on the Mitkof ground by the Trust. The recent slides on Mitkof all occurred in the absence of forest activity – public safety risks exist in the absence of forest activity. Maisch summarized that no one agency has jurisdiction on this issue. We may be asked this question because it's not clear who else can do this. Wolfe disagreed. He stated that the local government has the authority to deal with it. The S&TC did a good job of assessing the hazards. This issue is restricted to Petersburg; other areas with this risk have largely already been harvested.

Nichols added that there is a civil liability for private entities if something does happen, whether it's blowdown on a neighboring property, runoff, or landslides. The risks have typically been addressed through litigation rather than legislation.

Vinsel asked what the Commissioner, Governor, and Legislature thinks. Do they want us to bring public safety into FRPA? Maisch replied that the Board makes recommendations. The Board could state that they aren't comfortable making a recommendation to expand the authority. The DNR Commissioner, who is also the former Attorney General, expressed some concern that the Board hadn't addressed public safety, although he was open to the Board process. It struck him odd that the Board didn't address public

safety with regard to forest operations. The Board could pass the buck, but this Board was appointed to get good advice on issues like this.

Nichols declared that it is extremely difficult to regulate a natural phenomenon. FRPA does a good job of regulating bad decisions on the ground like putting fill on unstable ground. It's hard to regulate issues between land owners – how much of the landslide risk is natural, how much is associated with the forest operations? These things happen with every major storm event in Southeast Alaska. We can't regulate something caused by natural events. Maisch commented that there is a risk for operating on a steep slope, and that is also a financial decision. Different landowners accept different levels of risk. We hope liability deters bad decisions.

Freeman noted that there was a 1980s case where a landslide occurred some time after a 1960s timber harvest. The Superior Court held the state 10% responsible for downslope damages. The state appealed and the Supreme Court remanded it. The Supreme Court said that the Superior Court did not explain how it determined that the state harvest was the proximate cause of the slide. We don't know what happened after the remand – the case may have been settled.

Paul Maki, retired DOF forester, worked in Southeast at the time of the case. He explained that the site had been logged in the 1960s and had 20-30 foot tall regrowth when a rain event triggered the slide. The case was settled after the remand, and as part of the settlement the state removed some of the debris in the slide chute to reduce loading in case there was a subsequent slide event.

Nichols asked how long would a company's liability would be. Was the slide caused by eventual root failure? It is hard to be held liable if an operation was conducted consistent with the rules. Operators can't have liability hanging on for decades – liability insurance ends when the operation ends.

The Board summarized its positions on the appropriate location for indicators, the IG recommendations, and the overall "Option II" approach to landslide risks.

► **Wolfe moved that the indicators on unstable slopes and saturated soils reside in the BMP implementation book (the "purple book"). Bosworth seconded.** Hanley clarified that there were three options for the indicators for saturated soils from the IG – the green book only, the purple book only, or both. For the indicators on unstable slopes the options were both books or the purple book only. **The Board unanimously approved the motion.**

► **Vinsel moved that the indicators for unstable slopes and saturated soils also be included in the green book (the regulations). Seconded by Nicolls.** Vinsel agreed that the indicators should be in the purple book, but believes they should also be in the green book. Not all the operators use the purple book. He also agreed with the other reasons listed in support of including the indicators in the regulations: the more people that read these, the more effective they will be. Including them in the regulations lessens the impact of who uses which book. Wolfe said that his main reason for opposing this motion is that guidelines aren't appropriate in regulations. They are in the DPO regulation, but that is for submitting the DPO, not for specific BMPs that could have costly ramifications. Regulations have a specific role in law. Nichols doesn't like adding the indicators to the regulations because there aren't definitions for the terms in the indicators, e.g., "jack-strawed trees." These are indicators and different people can look at them differently. They are a guideline that is one of the things that helps an operator determine where to put a road. The indicators are better as a training tool. Bosworth said that he is aligned with Nichols and Wolfe for keeping them in the purple book. It's confusing enough when there are four separate rule books, and we make it more so by mixing apples and oranges unnecessarily. **Nicolls and Vinsel voted in favor of the motion; others were opposed.**

► **Wolfe moved to recommend that DNR proceed with adoption of the consensus recommendations from the I.G. McLarnon seconded. The Board unanimously approved the motion.**

Maisch asked whether there is a motion to affirm or change the Board's March 18, 2010 decision to follow Option II on the decision tree (*see handout*) to not request public safety authority in FRPA but update existing BMPs). Nichols suggested that the Board could just do nothing. We spent a lot of time on this. There were a lot of opinions on whether or not to make this decision and he wouldn't rehash it. Wolfe continues to be concerned that this work is simply referred to as public safety. It would be an expansion of DOF duties into other arenas. This shorthand does a disservice, and someone reading the record for the first time could misunderstand. Vinsel commented that the options chart shows that we have already gone down the Option II path with BMPs. If we had gone down the other path we would still be in the legislative process. If a legislator representing the constituents on this issue pursues the legislative path, we've already developed BMPs.

Dave Beebe, Petersburg said that it is hard to hear the teleconference due to page-turning. He noted that Nichols contended that this would be regulating natural events. There is data that clearcutting increases slides by a factor of five. Can the Board be objective on this issue?

Ed Wood, MHHA, emphasized that FRPA is the controlling authority for timber harvest other than for public safety issues. Addressing public safety requires an amendment. Liability is the primary reason why the Mental Health Trust hasn't logged. The Trust still has a timber harvest plan although they're proceeding with exchange. Wood supports the exchange. Homeowners can't get insurance for landslides as long as there's a risk of harvest. Logging increases the frequency of slide activity. The only other avenue for the Trust is to pursue a land exchange. It's a given that it doesn't remove the hazard of natural slides. The USFS wouldn't harvest the Mitkof Highway area. A successful land exchange would resolve the problem.

Don Koenigs, Petersburg reported that it was hard to hear Freeman's presentation by teleconference and requested a copy. He hasn't participated in the discussion before. His wife's property was affected by the last slide in Petersburg. He has been a resident of Petersburg for 35 years. He worked in Hollis area when there was eight inches of rain and eight feet of snow and there were eight massive slides, one of which he survived. He was a logging engineer for Ketchikan Pulp Company and worked in the field providing services associated with logging. In the 1980s he did consulting on the Mitkof land in question.

Koenigs reported that two harvests occurred at mile 4.2 on slopes >50% and at mile 6.8 on slopes in excess of 100%. There have been no slides since the harvesting in those areas over 30 years ago.

The question for the Board is of great interest. Koenigs has a copy of the recent MHHA letter. He said that he had recommended that the MHHA form after Mental Health Trust proposal to harvest above the highway. He also recommended that the Trust do an assessment of the risk factors throughout their property above the highway. He gave Doug Swanston's name to the MHHA when they formed. The recent slide pretty much destroyed Koenig's wife's property. He was not there on the day of the slide. The slide about 1400' long; he was initially unclear whether it started on the Trust property. Since then he clarified that it came from private property directly above Koenig's. Slopes were 20-30% over most of the property and 50-60% in the initiation area. A second slide slumped into the road ditch from Koenig's wife's property – there was no tree movement on that slide. These were natural slides – there was no harvesting. The MHHA letter is not accurate. He shares the concern with the landowners – safety is a concern for homes, the public highway, and the power line that is a lifeline for power from the Tyee project.

The Board has done a fine job. He doesn't have any problem with having some guidelines – that what's done by people who lay out timber. The situation along the highway is unraveling. There's a lot of

variation in the terrain. Risks are greatest at 4.2-5.3 mile and 5.9-6.8 mile due to shallow soils. Those trees have stood for 500-600 years – this is probably the 10th forest on the site. Winds from the SW are unraveling that hillside. Swanston’s letter says that as long as the trees stand it will be better. However, it’s unraveling. It would be better to do some stabilization. We need an open and honest dialog in the community regardless of who owns the property, because those people will still be at risk. Not logging isn’t the answer. There’s a greatest risk of the slope unraveling with the timber on-site. If the property were logged above Koenig’s property the risk would be reduced and he would reoccupy the property. Koenig has no interest or claim in taking action against the landowner. The hidden agenda is that the MHHA doesn’t want logging. We need to keep the dialog open to address the real safety issues. Especially at 6.1mile – there have been five slides at that site. Mitigation is needed regardless of the landowner. It would be harder to engage the USFS than the Trust to do mitigation. Koenig said that the state Dept. of Transportation (DOPT&PF) told him he had an obligation to address runoff from his property and he did address that. Along the Klehini Highway there are barriers to reduce rock fall. It is ridiculous to say the whole area is at risk along the highway. We need to find common ground to address the safety issues.

Nichols – clarified that the DPO Alcan filed on the Trust property expired, and Alcan has no existing agreement with the Trust on that property. Slenkamp agreed that the DPO did expire but stated that there is still potential for harvesting in the future.

Slenkamp said that there was a single request five years ago to Petersburg-Wrangell insurers for earth movement coverage. The DPO ran out more than three years ago. There is a new insurance application from a homeowner that is in process. The origin of the recent slide may or may not have come from the Trust land; most of the material came from another private ownership.

Koenigs noted that his vehicle insurance did cover the vehicle on the slide site. The issue with earth movement is whether you are willing to pay for earth movement insurance, not whether you can get it.

Suzanne West stated that she and all members of the homeowners association know that the Meucci family was unable to get landslide insurance. If an insurance applicant knows that the Trust still has plans for a timber sale, which is currently held in abeyance, and doesn’t acknowledge that to the insurance company, it could be considered fraud. She has climbed to the apex of the slides – what came down in the channel at 6-Mile is all logging debris. On the recent slide at 5.2-Mile, she did a line of sight estimate and it appears that the slide started on the Trust property adjacent to the Cottini property.

Hanley asked whether the Trust made its land selection from state lands. Slenkamp explained that the Mitkof parcel is original Trust land -- it predates the state selections. Hanley asked whether the Trust had discussed trading this parcel for other state land. Slenkamp said that the Trust is open to all proposals. Hanley recognized that the state Southeast State Forest land base is limited, but the Trust could look at lands elsewhere in the state. Curran commented that DOF wouldn’t want to manage the Mitkof land.

Maisch summarized the Board’s discussion. The Board doesn’t want to reconsider the original decision to not request authority for public safety under the FRPA.

Attendance

Randy Bates, ADF&G (teleconference)
Dave Beebe (teleconference)
Brianna Blackburn, Div. of Agriculture
Clarence Clark, DOF
Mike Curran, DOF (teleconference)
Bryce Dahlstrom, Viking Lumber
Rep. Alan Dick

Mark Eliot, DOF
Cynthia Erickson, aide to Rep. Dick
Marty Freeman, DOF
Kevin Hanley, DEC
Mayor Luke Hopkins, FNSB
Karrie Improte, CACFA
Rick Jandreau, DOF
Don Koenigs (teleconference)

Jim Kruse, USFS
Ricki LaMoss, aide to Sen. Coghill
Stan Leaphart, CACFA
Paul Maki, retired DOF
Joel Nudelman, DOF (teleconference)
Pat Palkovic, DOF (teleconference)
Devany Plentovich, AEA
Jim Schwarber, DOF

Paul Slenkamp, Alaska Mental Health Trust
Nancy Sonafrank, DEC
Greg Staunton, DOF (teleconference)
Helen Traylor, AEA
Representative Tammie Wilson
Paul Verhagen, aide to Rep. Dick
Suzanne West, MHHA (teleconference)
Ed Wood, MHHA (teleconference)



MINUTES
Board of Forestry Meeting
Tuesday-Wednesday, March 20-21, 2012
DEC Conference Room, 410 Willoughby Avenue, Juneau, AK

Tuesday, March 20, 2012

Call to Order and Roll Call. Chairman Chris Maisch called the meeting to order at 8:35 am. The Anchorage teleconference site was connected. No one was present in Fairbanks. Rob Bosworth, Matt Cronin, Jeff Foley, Mark Vinsel, Wayne Nicolls, and Eric Nichols were present and a quorum was established. Erin McLarnon was absent. Ron Wolfe arrived after the meeting started.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

Landslide regulations, training, and field book updates

Greg Staunton reported on the process that the Division of Forestry will likely take updating Division of Forestry regulations related to landslide issues and other regulations that need housekeeping. The Division is reluctant to dive into changing regulations at this point in the year due to staffing issues and seasonal workload. The current priority is to train the major operators on the findings. A long term goal is to develop a field book. This could be an expansion of the Purple Book but more likely a separate field book will be developed. The Purple Book is intended to guide consistent measurement of forest practices implementation. The landslide issue centers on practices for improving road construction to decrease the risk of landslide. The amount of road and the way it is constructed impacts the likelihood of landslide. The type of ground, type of weather, and hydrologic issues are also factors. The Division is planning classroom sessions as well as tailgate sessions for operators to address these issues.

Attendance

Peter Bangs, DFG
Dave Beebe, Commercial fisherman
Arthur "Butch" Blazer, USDA Deputy Under Secretary for Natural Resources & Environment
Clarence Clark, DNR Division of Forestry
Mike Curran, DNR Division of Forestry
Representative Alan Dick
Rick Edwards, USFS
Glenn Haight, CED
Kevin Hanley, DEC Division of Water

Dave Harris, USFS Director of FM
Brian Kleinhenz, Sealaska
Doug Martin, Martin Environmental
Ruth Monahan, USFS
Kyle Moselle, DNR
Joel Nudelman, DNR Division of Forestry
Tricia O'Connor, USFS
Bev Ostoj, DNR Division of Forestry
Cassie Pinkel, CED
Devany Plentovich, AEA
Ted Schenk, USFS Region 10

Jim Schwarber, DNR Division of Forestry
Julie Smith, DNR
Greg Staunton, DNR Division of Forestry
Charley Streuli, USFS

Suzanne West, Mitkof Highway Homeowners
Assn.
Dave Beebe called from Petersburg



MINUTES
Board of Forestry Meeting
Thursday-Friday, November 8-9, 2012
Univ. of Alaska, Room International Arctic Research Center (IARC) 501, Fairbanks, AK

Thursday, November 8, 2012

Call to Order and Roll Call. Chairman Chris Maisch called the meeting to order at 8:28 a.m. The Anchorage and Juneau teleconference sites were connected. Jeff Foley, Erin McLarnon, Matt Cronin, Mark Vinsel, Wayne Nicolls, Eric Nichols, Chris Stark, and Ron Wolfe were present. All members were present and a quorum was established.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites.

Landslide regulations. Freeman: DOF has worked with the Attorney General's Office to prepare the package of regulations to implement the recommendations from the landslide standards review process that were endorsed by the Board last December (*see handout*).

The amendments would

- Use the new term "unstable area" in the section on DPOs (11 AAC 95.220), and include indicators for identifying unstable areas;
- Use the term "unstable slope" in all other BMPs that previously used the terms "unstable slope," "unstable or slide-prone slope," or "unstable slope or slide-prone area," and a definition for "unstable slope" to the definitions section (11 AAC 95.900). This applies to the BMPs on road construction (11 AAC 95.290), harvest unit planning and design (.340), landings (.345), cable yarding (.360), and tracked and wheeled harvest systems (.365).
- Add a definition for "unstable fill material" to the regulatory definitions and use the new term in the BMP on balancing cuts and fills in road construction (11 AAC 95.290(b)(2))
- Add a new subsection to the cable yarding BMPs (11 AAC 95.360) requiring that operators minimize disturbance to soils, understory vegetation, stumps, and root systems.
- Add a new subsection to the harvest planning BMPs (11 AAC 95.340) requiring that operators consider techniques such as partial cuts, retention areas, and helicopter or skyline yarding to minimize disturbance.
- Add to the tracked and wheeled harvesting BMPs (11 ACC 95.365) a requirement that an operator provide notice to DOF before operating tracked or wheeled equipment on unstable slopes.

DOF plans to issue the public notice for the regulation package in the next few weeks. In addition to all the public notice requirements for regulations, DOF will send the notice to the mailing lists for the Science and Technical Committee and Implementation Group process.

Attendees

- Connie Adams, Tetlin Village Council
- Danny Adams, Tetlin Village Council
- Chris Barger, ADF&G-Wildlife
- Randy Bates, ADF&G-Habitat
- Karis Berrian, DNR
- Dan Bross, KUAC
- Josh Brown, Young's Timber
- Kristie Charlie, Tetlin Village Council
- Clarence Clark, DOF
- Elliot Cruikshank, Young's Timber
- Mike Curran, DOF
- Thomas Deerfield, consultant
- Clare Doig, consultant (teleconference)
- Jim Durst, ADF&G-Habitat
- Al Edgren, DOF
- Mark Eliot, DOF
- Marty Freeman, DOF
- Orville Fuhrman, Young's Timber
- Julie Hagelin, ADF&G
- Kevin Hanley, DEC
- Doug Hanson, DOF
- Dave Harris, USFS
- Glen Holt, UAF Cooperative Extension
- Jeff Hermanns, DOF
- Billy Lance, Young's Timber
- Tom Lenhart, AGO (teleconference)
- Paul Maki
- Tom Malone, UAF
- Joe Maynard, Young's Timber
- Kyle Moselle, DNR OPMP (teleconference)
- J.C. Nelson, Young's Timber
- Kathy Nichols, DCCED
- Joel Nudelman, DOF (teleconference)
- Ed Packee, consultant
- Al Pagh, Four Star Lumber
- Tom Paragi, ADF&G-Wildlife Conservation
- Cassie Pinkel, DCCED
- Devany Plentovich, AEA
- J.D. Reetz, Young's Timber
- Mike Reggear, DOF
- Maggie Rogers, DOF
- Jim Schwarber, DOF
- Larry Stienbarger, Young's Timber
- Chris Strub, Bristol Bay Native Assn.
- Philip Stuck, Young's Timber
- Paul Slenkamp, Mental Health Trust Land Office
- Timothy Thomas, Young's Timber
- Jon Tillinghast (by teleconference)
- Patricia Young, Tetlin Village Council
- Joe Young, Young's Timber



MINUTES
Board of Forestry Meeting
Tuesday – Wednesday, March 20 – 21, 2012
Dept. of Environmental Conservation Conference Room, 410 Willoughby,
Juneau, Alaska

Tuesday, March 20, 2012

Call to Order and Roll Call. Chairman Chris Maisch called the meeting to order at 8:35 am. The Anchorage teleconference site was connected. No one was present in Fairbanks. Rob Bosworth, Matt Cronin, Jeff Foley, Mark Vinsel, Wayne Nicolls, and Eric Nichols were present and a quorum was established. Erin McLarnon was absent. Ron Wolfe arrived after the meeting started.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites. *(See handout)*

Landslide regulations, training, and field book updates

Greg Staunton reported on the process that the Division of Forestry will likely take updating Division of Forestry regulations related to landslide issues and other regulations that need housekeeping. The Division is reluctant to dive into changing regulations at this point in the year due to staffing issues and seasonal workload. The current priority is to train the major operators on the findings. A long term goal is to develop a field book. This could be an expansion of the Purple Book but more likely a separate field book will be developed. The Purple Book is intended to guide consistent measurement of forest practices implementation. The landslide issue centers on practices for improving road construction to decrease the risk of landslide. The amount of road and the way it is constructed impacts the likelihood of landslide. The type of ground, type of weather, and hydrologic issues are also factors. The Division is planning classroom sessions as well as tailgate sessions for operators to address these issues.

Attendance

Peter Bangs, DFG
Dave Beebe, Commercial fisherman
Arthur “Butch” Blazer, USDA Deputy Under Secretary for Natural Resources & Environment
Clarence Clark, DNR Division of Forestry
Mike Curran, DNR Division of Forestry
Representative Alan Dick
Rick Edwards, USFS
Glenn Haight, CED
Kevin Hanley, DEC Division of Water
Dave Harris, USFS Director of FM
Brian Kleinhenz, Sealaska
Doug Martin, Martin Environmental
Ruth Monahan, USFS

Kyle Moselle, DNR
Joel Nudelman, DNR Division of Forestry
Tricia O’Connor, USFS
Bev Ostoj, DNR Division of Forestry
Cassie Pinkel, CED
Devany Plentovich, AEA
Ted Schenk, USFS Region 10
Jim Schwarber, DNR Division of Forestry
Julie Smith, DNR
Greg Staunton, DNR Division of Forestry
Charley Streuli, USFS
Suzanne West, Mitkof Highway Homeowners Assn.
Dave Beebe called from Petersburg



**FINAL MINUTES
Board of Forestry Meeting
NOVEMBER 8-9, 2012**

University of Alaska, Room International Arctic Research Center (IARC) 501, Fairbanks

Thursday, November 8, 2012

Call to Order and Roll Call. Chairman Chris Maisch called the meeting to order at 8:28 a.m. The Anchorage and Juneau teleconference sites were connected. Jeff Foley, Erin McLarnon, Matt Cronin, Mark Vinsel, Wayne Nicolls, Eric Nichols, Chris Stark, and Ron Wolfe were present. All members were present and a quorum was established.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites. *(See handout)*

Landslide regulations. Freeman: DOF has worked with the Attorney General’s Office to prepare the package of regulations to implement the recommendations from the landslide standards review process that were endorsed by the Board last December (*see handout*).

The amendments would

- Use the new term “unstable area” in the section on DPOs (11 AAC 95.220), and include indicators for identifying unstable areas;
- Use the term “unstable slope” in all other BMPs that previously used the terms “unstable slope,” “unstable or slide-prone slope,” or “unstable slope or slide-prone area,” and a definition for “unstable slope” to the definitions section (11 AAC 95.900). This applies to the BMPs on road construction (11 AAC 95.290), harvest unit planning and design (.340), landings (.345), cable yarding (.360), and tracked and wheeled harvest systems (.365).
- Add a definition for “unstable fill material” to the regulatory definitions and use the new term in the BMP on balancing cuts and fills in road construction (11 AAC 95.290(b)(2))
- Add a new subsection to the cable yarding BMPs (11 AAC 95.360) requiring that operators minimize disturbance to soils, understory vegetation, stumps, and root systems.
- Add a new subsection to the harvest planning BMPs (11 AAC 95.340) requiring that operators consider techniques such as partial cuts, retention areas, and helicopter or skyline yarding to minimize disturbance.
- Add to the tracked and wheeled harvesting BMPs (11 ACC 95.365) a requirement that an operator provide notice to DOF before operating tracked or wheeled equipment on unstable slopes.

DOF plans to issue the public notice for the regulation package in the next few weeks. In addition to all the public notice requirements for regulations, DOF will send the notice to the mailing lists for the Science and Technical Committee and Implementation Group process.

Attendees

- Connie Adams, Tetlin Village Council
- Danny Adams, Tetlin Village Council
- Chris Barger, ADF&G-Wildlife
- Randy Bates, ADF&G-Habitat
- Karis Berrian, DNR
- Dan Bross, KUAC
- Josh Brown, Young’s Timber
- Kristie Charlie, Tetlin Village Council
- Clarence Clark, DOF
- Elliot Cruikshank, Young’s Timber
- Mike Curran, DOF
- Thomas Deerfield, consultant
- Clare Doig, consultant (teleconference)
- Jim Durst, ADF&G-Habitat
- Al Edgren, DOF
- Mark Eliot, DOF
- Marty Freeman, DOF
- Orville Fuhrman, Young’s Timber
- Julie Hagelin, ADF&G
- Kevin Hanley, DEC
- Doug Hanson, DOF
- Dave Harris, USFS
- Glen Holt, UAF Cooperative Extension
- Jeff Hermanns, DOF
- Billy Lance, Young’s Timber
- Tom Lenhart, AGO (teleconference)
- Paul Maki
- Tom Malone, UAF
- Joe Maynard, Young’s Timber
- Kyle Moselle, DNR OPMP (teleconference)
- J.C. Nelson, Young’s Timber
- Kathy Nichols, DCCED
- Joel Nudelman, DOF (teleconference)
- Ed Packee, consultant
- Al Pagh, Four Star Lumber
- Tom Paragi, ADF&G-Wildlife Conservation
- Cassie Pinkel, DCCED
- Devany Plentovich, AEA
- J.D. Reetz, Young’s Timber

- Mike Reggear, DOF
- Maggie Rogers, DOF
- Jim Schwarber, DOF
- Larry Stienbarga, Young's Timber
- Chris Strub, Bristol Bay Native Assn.
- Philip Stuck, Young's Timber
- Paul Slenkamp, Mental Health Trust Land Office
- Timothy Thomas, Young's Timber
- Jon Tillinghast (by teleconference)
- Patricia Young, Tetlin Village Council
- Joe Young, Young's Timber



NOTE: The mass wasting regulations were not discussed at the December 14, 2012 Board of Forestry teleconference.



FINAL MINUTES
Board of Forestry Meeting
March 26-27, 2013
DEC Conference Room, 410 Willoughby Ave., Juneau

Tuesday, March 26, 2013

Call to Order and Roll Call. Chairman Chris Maisch called the meeting to order at 8:35 a.m. The Anchorage and Fairbanks teleconference sites were connected. Jeff Foley, Erin McLarnon, Matt Cronin, Mark Vinsel, Wayne Nicolls, Eric Nichols, and Ron Wolfe were present. A quorum was established. Chris Stark joined the meeting at 8:40.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites. *(See handout)*

FRPA mass wasting regulations. Freeman: The public comment period for the draft regulations closed January 31, 2013. Notices were published on state online sites and in the Anchorage Daily News, e-mailed to mail lists for the Board, S&TC and IG process mailing lists, Board of Forestry (BOF) meeting notices, DNR regulations mail list, and legislators. KFSK did an interview with Freeman and Ed Wood, and the SAF published the notice in their newsletter. She noted that two individuals on the mail lists didn't receive direct notices by e-mail, but they were each on two e-mail lists, she confirmed that the notices were sent, including to their e-mail addresses, and others on the same lists did receive the notices. DOF received comments from Sealaska Timber Corporation and the Southeast Alaska Conservation Council (SEACC) *(see handout)*. No changes were made as a result of the comments.

The Sealaska comments reviewed potential operational and economic impacts of the regulations and stated that they could be incorporated into existing harvest methods without undue cost or difficulty. SEACC generally supported the regulation changes but stated their disappointment with the Board's decision not to ask for authority to address public safety. They also requested that indicators for "unstable slopes" be included in the regulations rather than the implementation handbook, and that the 1994 Chatwin et al. citation be included in the regulations. Consistent with prior Board discussions, DOF did

not change the decision to address the “unstable slope” indicators through the implementation handbook and training. Similarly, DOF believes that the specific reference is best incorporated through training.

The final regulations have been submitted to the DNR Commissioner for signature. The next step will be the DEC Commissioner’s signature, final review by the Attorney General’s Office, and filing by the Lieutenant Governor.



DRAFT MINUTES
Board of Forestry Meeting
August 12-13, 2013
Kenai River Center, 514 Funny River Road, Soldotna

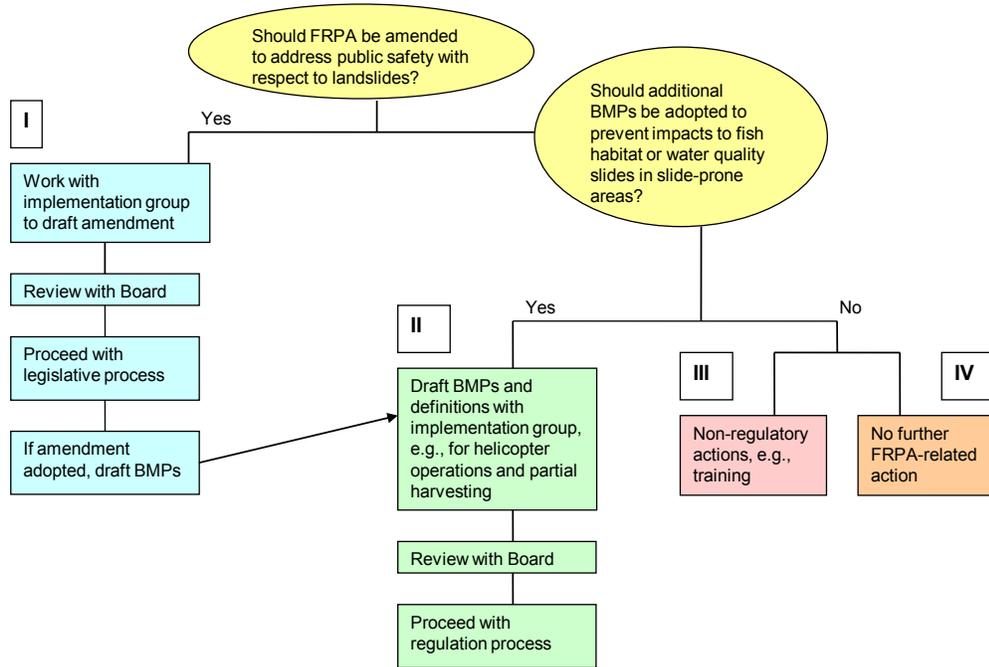
Monday, August 12, 2013

Call to Order and Roll Call. Chairman Chris Maisch called the meeting to order at 8:05 a.m. The Anchorage, Juneau, and Fairbanks teleconference sites were connected. Jeff Foley, Erin McLarnon, Matt Cronin, Mark Vinsel, Eric Nichols, Wayne Nicolls, and Chris Stark were present. Brian Kleinhenz was present as an alternate for Ron Wolfe. A full Board was present and a quorum was established.

Public Meeting Notice. The meeting was noticed by issuing public service announcements and press releases, mailing announcements to interested parties, and posting a notice on the state and Department of Natural Resources (DNR) websites. *(See handout)*

Mass wasting regulations. Marty Freeman (DOF): The mass wasting regulations have been signed by DNR and DEC, reviewed by the AGO agency attorney and regulations attorney, and are in final review at the Lt. Governor’s Office. These regulations implement the recommendations developed through the Science and Technical Committee, Implementation Group, and Board review. DOF will reprint the fieldbook for the regulations and distribute it to the Board, operators, and agencies. DOF will also publish the “Green Book” documentation of the process used to develop the regulations.

Landslide & Public Safety Decision Tree
1-11-10



Options for Addressing Public Safety Hazards from Landslides Associated with Commercial Forest Operations

January 11, 2010

Option	Authority	Notes
No change	None required	<p>FRPA has standards to prevent or minimized impacts of mass wasting on fish habitat & water quality, but not public safety. BMPs address slope stability and roading in steep areas, but not helicopter operations or partial harvesting.</p> <p>Landowners may have civil liability through court action for impacts on other people and property due to landslides caused by actions on their property.</p>
Non-regulatory FRPA actions		
Develop and offer a training program to forest landowners and operators. Material could cover identification of potential hazard areas, existing forest practices requirements, and other BMPs for preventing or minimizing risks of landslides	New authority to address public safety may be needed to spend state FRPA funds on public safety materials and training.	This could be done by either public or private entities (e.g., AFA)
Advisory field manual – provide written information on identification of potential hazard areas, existing forest practices requirements, and other BMPs for preventing or minimizing risks of landslides	New authority to address public safety may be needed to spend state FRPA funds on public safety materials and training.	This could be done by either public or private entities (e.g., AFA)
FRPA Regulatory changes		
<p>Require special BMPs on harvests in hazard zones , e.g.,</p> <ul style="list-style-type: none"> ▪ No ground-based harvesting ▪ Limits on road construction ▪ Partial harvesting 	Existing FRPA authority would apply to adoption of new/amended regulations to prevent impacts to fish habitat and water quality; new regulations to prevent impacts to public safety would require a statutory amendment	Note: Under AS 41.17.060(b)(5), new regulations that specify practices such as limits on ground-based harvesting and road construction, or requirements for selective harvesting in high hazard zones could be adopted to prevent or minimize impacts to fish habitat or water quality whether or not these practices were applied to public safety

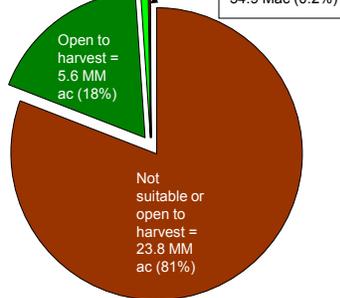
Define “slope that has a high risk of slope failure” and require a site-specific assessment of risk prior to submitting a DPO	These terms are in FRPA; definitions could be adopted as new regulations.	Note: Oregon requires a site-specific assessment in high-hazard zones
FRPA Statutory changes		
Amend FRPA to add public safety to the values protected under AS 41.17.060(b)(5)	Existing FRPA authority is limited to preventing impacts to fish habitat and water quality; this would require a statutory amendment	
Amend FRPA to prohibit or restrict harvests for public safety or resource concerns would require statutory changes	No existing authority – requires statutory amendment	Note: This is the option recommended by the Mitkof Highway Homeowners Association. Note: FRPA does not prohibit harvesting in other situations except in riparian buffers, and variations are allowed in buffers. FRPA is a DPO process, not a permit process.
Non-FRPA authorities		
Municipal ordinances or zoning to prohibit or regulate harvesting in hazardous areas	AS 29 provides powers for planning, platting, and land use regulation (e.g., zoning regulations and land use permit requirements). Boroughs, and 1 st class cities and home rule cities in the unorganized borough, <u>must</u> exercise these powers; 2 nd class cities in the unorganized borough <u>may</u> adopt these powers. DNR has zoning authority in the unorganized borough but has rarely exercised that authority	Wrangell, Ketchikan Gateway, and Haines boroughs, the 1 st class cities of Petersburg, Cordova, and Craig, and the 2 nd class city of Thorne Bay have land use regulation authority. The 2 nd class cities of Kasaan and Coffman Cove currently do not have this authority. Scoping areas for hazards near populated areas also exist near Hollis, Whale Pass, Klawock Lake, and Port St. Nicholas outside incorporated communities.
Restrictions on land sales in hazard zones (DNR, trusts, municipalities)	Land use planning and classification under AS 38.04 for state land; AS 29 land use regulation authority in boroughs and 1 st class cities; Trust managers have the authority on University and Mental Health Trust land (11	

	AAC 99)	
DOT advisories and signage in hazard areas	ADOT&PF has responsibility for slope stability and public safety within ROW limits ¹¹	
Seasonal road closures	ADOT&PF responsibility for slope stability and public safety within ROW limits (see note 1 above)	
Homeowners' insurance	No public authority to require homeowners to carry landslide insurance. Individual homeowners may purchase insurance against landslide damage if policies are available. State Div. of Insurance regulates insurance companies (AS 21)	
Forest landowners' insurance and bonding	AS 36.25.010 for contractor's bonds; 11 AAC 71.095 for performance bonds on state timber sales. State long form contracts require liability insurance; short form (small sales) only indemnify the state. Individual owner's contractual authority on other lands	
Land exchanges (e.g., Mental Health Trust/USFS)	AS 38.05.010 for state land; Trust land managers' authority for University and Mental Health Trust land (11 AAC 99.030)	Note: public land exchanges (including Trust land) typically require equal-value exchanges based on appraised values or legislative/congressional approval.

¹¹ Per Bruce Brunette (ADOT&PF): ADOT&PF is responsible for slope stability and public safety within its ROW limits. While ADOT&PF doesn't have control beyond the ROW, they do everything in their power within the ROW to maintain stability to the adjoining properties. Sometimes this involves extensive engineering solutions, which may include construction of retaining walls and/or drainage improvements. If a slope problem does occur beyond the ROW which in their opinion compromises public safety, results in a fatality or causes extraordinary road maintenance, they may find the offending property owner wholly or partially responsible, particularly if a known slope hazard had been identified.

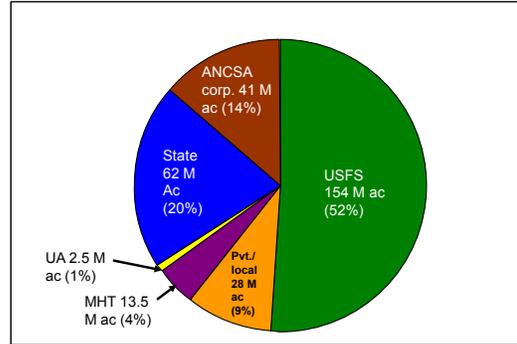
Harvest status of land in analysis area (29.4 MMac in SE Alaska from Yakutat south; does not include Cordova)

Open to harvest within 1/2-mi of public road = 301 Mac (0.8%)

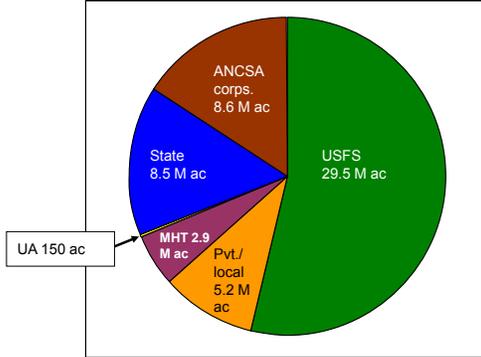


Open to harvest within 1/2-mi of public road and in hazard zone = 54.9 Mac (0.2%)

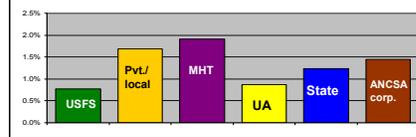
Who owns available forest land within 1/2-mile of public roads? (301.1 Mac)



Who owns available forest land within 1/2-mile of public roads in hazard zone (54.9 Mac)

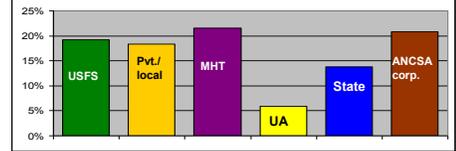


Percent of total area open to harvest (5.6 MM ac) that is in hazard zone by landowner

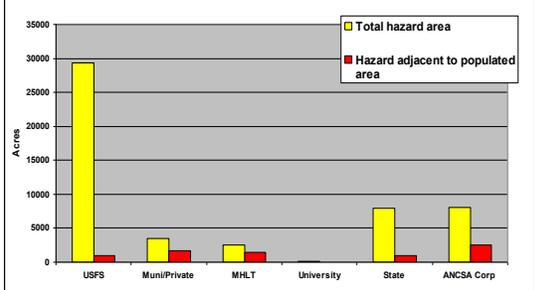


How much of the available forest land is in the hazard zone?

Percent of area open to harvest within 1/2-mile of public road (301.1 Mac) that is in hazard zone by landowner



Land ownership in FRPA landslide hazard area



Total hazard area = 51,715 acres
 Total hazard area adjacent to populated areas = 7,566 acres
 Muni/private and state land likely to decrease; UA likely to increase

Statistics slides from PowerPoint presentations to the Board of Forestry on August 12, 2009 and October 7, 2009



Overview of Public Involvement in Review of Landslide Hazards and FRPA Best Management Practices
December 7, 2011

Public meetings. All meetings during this process were publicly noticed, and provided opportunity for public comment. This included 14 Board of Forestry meetings, 10 Science & Technical Committee meetings, and 3 Implementation Group meetings. All Board meetings were publicly noticed.

Public mailings. In addition, advanced information about the Science & Technical Committee (S&TC) and Implementation Group processes sent to a mail list of over 120 individuals, organizations, municipalities, Native corporations, businesses, and agencies with interest in this issue. Minutes of all S&TC and Implementation Group meetings were sent to the mail list.

Implementation Group. The Implementation Group included representative of state resource agencies, forest landowners, operators, municipal governments, and affected interests. The Mitkof Highway Homeowners Association was invited to participate in the Group. They declined to do so because the Group was directed by the Board to focus on existing authorities of the Forest Resources and Practices Act (FRPA) to protect fish habitat and water quality, but not expanding FRPA authorities to address public safety.

Public comments received. During this period three people from Petersburg, including two representatives of the Mitkof Homeowners, spoke to the Board requesting legislative changes to FRPA to address public safety. One person from Petersburg spoke in favor of actively managing the forests on the Mitkof slopes to reduce landslide damage. The Southeast Alaska Conservation Coalition (SEACC) and an individual from Fairbanks spoke in support of HB91. The Mental Health Trust Land Office spoke to the Board regarding its proposed land exchange, and concerns about the effects of amending FRPA. One representative from Shaan-Seet requested that the S&TC scoping process include Shaan-Seet land along Port St. Nicholas.

The Mitkof Homeowners also submitted seven letters to the Division of Forestry, and copies of additional letters to the Mental Health Trust and the Congressional delegation regarding slides on Mitkof Island, HB 91, concerns that FRPA does not provide protection for public safety, and support for a Mitkof Island land exchange between the US Forest Service and Mental Health Trust. Their last letter suggested that Board members could be liable for failing to act to prevent harm to public safety, and raised the potential of litigation over harm from future slides.

Legislation. During the 2011 session, Representative Peggy Wilson introduced HB91, a bill to add public safety authority to FRPA. No public hearings were held on the bill in 2011. The bill remains active in the House Resources Committee at the beginning of the 2012 session.

Regulations. The process to adopt regulations is established by the Alaska Administrative Procedures Act (AS 44.62.050). This process includes review of the proposed regulations by the public and agencies, the Department of Law, and the Lieutenant Governor's Office. Changes to FRPA require signature by DNR and DEC. Public notice of the proposed regulations was published on state online sites and in the Anchorage Daily News, e-mailed to mail lists for the

Board, S&TC and IG process mailing lists, Board of Forestry (BOF) meeting notices, DNR regulations mail list, and legislators. The public comment period for the draft regulations was open from December 11 through January 31, 2013. KFSK did a radio interview with DOF and Ed Wood (Mitkof Highway Homeowners' Association), and the SAF published the notice in their newsletter. Two individuals on the mail lists reported that they didn't receive direct notices by e-mail, but they were each on two e-mail lists, she confirmed that the notices were sent to their e-mail addresses, and others on the same lists did receive the notices. DOF received comments from Sealaska Timber Corporation and the Southeast Alaska Conservation Council (SEACC), and written responses to the comments are part of the regulation package. DNR and DEC signed the proposed regulations without change.

Timeline of process to review and revise Forest Resources and Practices Act standards for mass wasting:

Board of Forestry (BOF), Science & Technical Committee (S&TC), and Landslide Standards Implementation Group (LSIG) meetings

July 19, 2013

Detailed information on Board of Forestry (BOF), Science & Technical Committee (S&TC), and Landslide Standards Implementation Group (LSIG) meetings is available in the minutes for these meetings.

<p>October 9, 2007 BOF</p>	<p>Mitkof Highway Homeowners Association (MHHA, Ed Wood) requests BOF take action to amend FRPA to address public safety: <i>“Activities that increase susceptibility to slope failures (such as logging) should be prohibited or restricted if slope failures pose a danger to life or property. Critical facilities, homes, and other buildings for human occupancy should not be located in areas susceptible to major slope failure.”</i></p> <p>DNR presented a white paper summarizing the issue, and an overview of existing statutory and regulatory direction on landslides, gaps in standards, and comparable standards in Oregon, Washington, and Tongass National Forest. Ed Wood complimented DOF on the white paper and expressing appreciation for the Board’s efforts.</p>
<p>Feb. 12-13, 2008 BOF</p>	<p>BOF continued discussing the MHHA request and issue of mass wasting and public safety.</p>
<p>July 9, 2008 BOF</p>	<p>BOF unanimously requests DNR to convene a science and technical committee (S&TC) to:</p> <ul style="list-style-type: none"> ▪ Review and synthesize existing information on landslide occurrence in Alaskan forests. ▪ Define the following terms and provide guidance for determining where these conditions exist: “unstable or slide-prone slope”, “slope that has a high risk of slope failure”, and “fill material prone to mass wasting.” ▪ Provide guidance for determining where a public safety risk exists, e.g., combination of unstable slopes and human occupancy/use in potential slide path. ▪ Develop additional BMPs for harvesting and yarding methods in unstable or slide-prone areas.
<p>Nov. 12, 2008 BOF</p>	<p>BOF updated on process to convene S&TC. Ed Wood commented that he wants the committee to provide maximum protection to public in hazard areas, and have the BMPs recognize public rights to protection. He thanked the Board for moving forward on this issue.</p>

Feb. 10, 2009 S&TC	S&TC convened and began assessing the geographic scope of the potential public safety risks associated with forest operations. The S&TC includes expertise on soils, hydrology, geology, fish habitat, forest management, FRPA implementation, and public highways. The committee reviewed a first draft of a landslide hazard model developed by Hans Buchholdt, DOF GIS specialist, based on slope, land ownership, forest cover, known landslides, and publicly used roads. The committee had both site-specific and general recommendations for upgrading the model.
March 19, 2009 BOF	BOF updated on S&TC process. DNR is incorporating S&TC recommendations into a second version of the hazard model. The S&TC asked for clarification on the Board's intent for addressing public safety – is it limited to risks to people and residences, or does it include damage to infrastructure, such as utility transmission lines? The Board responded that the focus for the S&TC is on public safety rather than infrastructure. Ed Wood commented to the Board in support of continuing with the S&TC process, and offered to petition the legislature and governor for additional FRPA funding if needed.
April 1, 2009 S&TC	S&TC meetings to compile bibliography of relevant references, define key terms, and develop model to assess the geographic extent of potential landslide hazards associated with timber operations near public roads, and produce maps of potential hazard areas.
April 28, 2009 S&TC	
July 16, 2009 S&TC	
July 29, 2009 S&TC	
Aug. 11-13, 2009 BOF	BOF tours landslide hazard areas in Port St. Nicholas, Craig-Klawock, and Black Bear areas on Prince of Wales Island. DNR updated the BOF on S&TC scoping process, including bibliography, draft definitions, hazard model, and maps. The BOF asked the S&TC to further subdivide the identified hazard areas into areas with habitation and areas with only public roads. A BOF member asked that forest landowners have an opportunity to review the draft hazard maps. Rep. Peggy Wilson spoke to BOF noting homeowner concerns and the importance of both the timber industry and public safety. Ed Wood spoke to BOF, praised the S&TC process, and noted that only a small percentage of commercial forest land has identified hazards. The BOF directed DNR to organize a committee charged with identifying a menu of options both within and outside FRPA, recognizing past processes and principles used in developing the FRPA, identifying additional data needs, and recommending options to the Board.
Sept. 2009	Copies of S&TC hazard maps sent to forest landowners for review. Landowner information on public roads and local topography were incorporated into the maps.

DOF & Land owners	DOF staff reviewed the hazard areas on airphotos to identify which sites included habitation. Maps were edited to split hazard areas into areas with residential or commercial buildings, and those with public roads only.
Sept. 28, 2009 S&TC	S&TC reviewed updated maps and identified sites for further review prior to BOF meeting.
Oct. 7-8, 2009 BOF	<p>DOF updated the Board on the hazard maps with separate categories for inhabited areas and public use only, and summarized the landowner review process. The Board requested that the maps be retitled to emphasize that they are scoping maps. The Mental Health Trust briefed BOF on economic impacts of not harvesting their Mitkof property due to homeowner concerns, and their efforts to trade Mitkof and other property near communities for other USFS land with commercial forests. Ed Wood stated that there are known landslide hazards in the Mitkof Highway area and more slides will occur with timber harvesting. The MHHA supports the Mental Health Trust land exchange.</p> <p>The Board discussed the issue at length, including the scope of the hazards relative to the extent of forest land, and options for addressing safety concerns through FRPA or other means.</p> <p>BOF asked DOF to contact the Attorney General’s Office to determine whether including public safety in the FRPA section on landslides could keep the public safety issue narrowly focused on landslides. DOF agreed to contact the AGO, provide a summary of current FRPA best management practices, and identify any “holes” in the BMPs at the next meeting.</p>
March 17-18, 2010 BOF	<p>BOF reviewed a video of helicopter operations at Echo Cove along with pre- and post-harvest aerial imagery because helicopter harvesting may be one way to reduce landslide risk in hazardous areas.</p> <p>DOF presented</p> <ul style="list-style-type: none"> • revised text for the scoping map legend, and updated maps showing municipal boundaries and past harvesting in hazard areas, • an updated white paper with a summary of the science and technical committee findings, an expanded section on other approaches to this issue that includes WA, OR, CA, BC, and the Tongass NF, and a section on authorities for public safety, • a draft chart showing options for addressing public safety issues from landslides associated with commercial forest operations, and • a decision tree with four general paths for addressing FRPA-related portions of the public safety issue: <ul style="list-style-type: none"> ○ Amending FRPA to add public safety to the considerations for preventing or minimizing adverse effects of erosion and mass wasting ○ No change to FRPA; Amend the regulations to adopt definitions to clarify authorities and BMPs to minimize effects on fish habitat and water quality, e.g., BMPs for helicopter yarding, selective harvesting, etc. ○ No change to FRPA or regulations. Initiate addition non-regulatory actions such as training. ○ No new FRPA-related action.

	<p>Under all options, existing BMPs would apply, along with civil liability, and opportunities to address safety issues through local ordinances.</p> <p>The MHT gave an update on their continuing land exchange process. Ed Wood noted that areas of concern on Mitkof don't contain salmon streams. He noted that Petersburg is an incorporated city that includes the Mitkof Highway area, but it hasn't adopted zoning address the landslide issues.</p> <p>The Board discussed the issue at length, including local government authorities, and the scope of hazard areas. The Board unanimously adopted Option II from the decision tree -- a process to draft BMPs for review by the Board before deciding whether or not to proceed toward adopting them as regulations.</p>
Aug. 25, 2010 BOF	DOF reported to BOF – the S&TC will include the same members as for the scoping process with the addition of a helicopter harvesting expert and deletion of the public highways representative. MHT provided an update on ongoing land exchange efforts. Ed Wood asked about regulatory status of FRPA best management practices.
Sept. 2, 2010 S&TC	<p>The S&TC met four times to</p> <ul style="list-style-type: none"> • update and expanded the landslide bibliography with information on landslide effects on fish habitat, effects of forest practices on landslide risk, links between soil disturbance and slope stability, and techniques for assessing landslide risk. • Recommend definitions for key terms • Provide indicators for determining when “saturated soil conditions” exist on slopes. • Review existing BMPs and recommend updates. In general, the S&TC said that the BMPs did a reasonable job of addressing landslide risks. The committee recommended additions to further strengthen the BMPs with respect to disturbance from cable-yarding operations, techniques to minimize disturbance from harvest units on unstable slopes or slide-prone areas, use of tracked or wheeled harvest systems on unstable slopes or slide-prone areas, and blasting during saturated soil conditions. • The S&TC did not reach consensus on the threshold for requiring end-haul and full-bench road construction methods. They identified two options for this BMP. • Identify training needs for agencies, landowners, and operators
Nov. 1, 2010 S&TC	
Nov. 23, 2010 S&TC	
Dec. 8, 2010 S&TC	
Dec. 13-14, 2010 BOF	<p>DOF briefed the Board on the S&TC recommendations.</p> <p>Ed Wood and Suzanne West, Mitkof Highway Homeowners' Association (MHHA) commented that BMPs don't address public safety issues. There are no fish streams on the Mental Health Trust land of concern to the MHHA. Trust land harvest operations would occur 150' from their drinking water outtake. Debris from timber harvesting would wipe out streams. The water quality and fish habitat work has nothing to do with public safety.</p> <p>The Board reviewed its position on the public safety issue. Members noted that many activities cause slides, and slides occur both naturally and from human activity. Other authorities, particularly local planning and zoning under Title 29 are better</p>

	<p>suited to address these issues. The scoping process identified safety hazards from slides on a small percentage of the area. The issue is localized and doesn't merit a change in the statewide statute; local processes are more appropriate to the scale of the issue. Fish habitat and water quality BMPs also provide some protection for public safety. Water quality includes non-fish streams that are used for drinking water.</p> <p>The Board recognizes that there are various hazards next to communities. Any changes to the land can trigger problems, and it's hard to identify what are the results of human activities and acts of God, especially 5-10 years after harvesting is complete. The Board is trying to manage risk, and different people are comfortable with different levels of risk. The agencies need to use best professional judgment on the ground. DOF's role is to provide sound professional guidance on how to use BMPs to minimize risk, and operators and landowners have to implement the practices. Wolfe emphasized that FRPA is not a permit, it is a notification system. There aren't "practices acts" for other developments activities like subdivisions. Other bodies of law are more important for this issue.</p> <p>The Board unanimously directed DOF to convene an Implementation Group to determine how to best implement the S&TC recommendations in a practical and effective manner. An Implementation Group would include representative of state resource agencies, forest landowners, operators, and affected interests. The S&TC recommendations do not require any statutory changes, but may mean regulatory updates. Any regulation changes would go through the standard public process for adopting regulations.</p>
<p>Jan. 31, 2011 BOF</p>	<p>The Board met by teleconference to review and hear public comment on forestry-related legislation, including HB91, a bill introduced by Rep. Peggy Wilson to add public safety to FRPA. SEACC, three individuals from Petersburg and one from Fairbanks spoke in support of the bill. The Petersburg city manager said the city has supported efforts to provide public safety on high-sloped areas. The Mental Health Trust spoke in opposition to the bill. DOF briefed the Board on the bill and raised concerns over vague terms, and conflicts with other sections of FRPA.</p>
<p>Mar. 31- Apr. 1, 2011 BOF</p>	<p>DOF briefed the Board on the proposed Implementation Group organization and membership.</p>
<p>Aug. 9, 2011 LSIG</p>	<p>The Implementation Group met twice to review nine of the ten consensus points from the Science & Technical Committee. The Group endorsed most of the S&TC consensus points, with minor changes for clarification. They split the term "unstable slope or slide-prone area" into two terms: "unstable area" for use in the Detailed Plan of Operations (DPO) regulations under 11 AAC 95.220, and "unstable slope" for the other BMPs. The indicators developed by the S&TC would be included in the definition for "unstable area" in the regulations under .220. The Group did not reach consensus on whether to include the indicators with a definition of "unstable slope" in the regulations or add them to the BMP implementation field book ("purple book").</p> <p>The Group did not reach agreement on the S&TC Consensus 8 which recommending the following deletion:</p>
<p>Aug. 23, 2011 LSIG</p>	

	<p>“(b) If constructing a road on a slope greater than 67 percent, on an unstable slope, or in a slide-prone area is necessary, an operator [...]</p> <p>(3) may not conduct excavation and blasting activities during saturated soil conditions. [IF MASS WASTING IS LIKELY TO RESULT AND CAUSE DEGRADATION OF SURFACE OR STANDING WATER QUALITY.]”</p>
Aug. 30-31, 2011 BOF	<p>DOF briefed the Board on the Implementation Group recommendations. Suzanne West from MHHA reiterated concerns over potential timber harvesting on Mental Health Trust land above the Mitkof Highway.</p> <p>The Board unanimously recommended leaving the language referring to degradation of water quality in place in the blasting BMP.</p>
Sep. 27, 2011 LSIG	<p>The Implementation Group reviewed the last of the S&TC consensus and non-consensus points.</p> <p>The Group deferred to the Board’s decision to retain the qualification that restrictions to blasting and excavation under saturated soil conditions (11 AAC 95.290(b)(3)) and end-hauling and full-bench construction (11 AAC 95.290(d)) be limited to conditions where mass wasting “is likely to occur and cause degradation of surface or standing water quality.”</p> <p>The Group did not agree on whether to include the indicators for “saturated soils” and “unstable slope” in the regulations or the BMP implementation field book (“purple book”). Next steps may include conducting the regulation process, training programs, updates to the “purple book,” and other actions depending on BOF decisions.</p>
March 20, 2012 BOF	<p>DOF briefed the Board on the regulation process, and training for operators on the proposed standards.</p>
Nov. 29-30, 2012 BOF	<p>DOF briefed the Board on the final consensus recommendations and non-consensus points from the Implementation Group. Kevin Saxby, AGO, spoke to the Board about legal issues raised by the MHHA in a recent letter, and emphasized that</p> <ol style="list-style-type: none"> 1) If a lawsuit is brought, and the Department of Law finds that the person charged was acting in their official authority, the state will provide the defense, and it becomes a suit against the state rather than against the individual. 2) There is a prohibition against lawsuits on policy-level discussions and decisions. <p>Ed Wood, Suzanne West, and Dave Beebe of Petersburg described recent slides above the highway, lack of available insurance for damage from landslides, increasing risk of landslides following timber harvest, and the ongoing need for an amendment to FRPA to address public safety.</p> <p>Don Koenigs of Petersburg described the most recent Mitkof slide, decreasing risk of landslide damage following harvesting, and the need to manage the Mitkof slopes to reduce hazards.</p>

	<p>The Board unanimous voted to</p> <ol style="list-style-type: none"> 1) locate the S&TC/IG indicators on unstable slopes and saturated soils reside in the BMP implementation book (the “purple book”) rather than the regulations. 2) recommend that DNR proceed with adoption of the consensus recommendations from the I.G.
<p>March 26-27, 2013</p>	<p>DOF briefed the Board on the process to adopt the proposed regulations to implement the consensus recommendations from the I.G. The public comment period for the draft regulations closed January 31, 2013. Notices were published on state online sites and in the Anchorage Daily News, e-mailed to mail lists for the Board, S&TC and IG process mailing lists, Board of Forestry (BOF) meeting notices, DNR regulations mail list, and legislators. KFSK did an interview with Freeman and Ed Wood, and the SAF published the notice in their newsletter. Two individuals on the mail lists reported that they didn’t receive direct notices by e-mail, but they were each on two e-mail lists, she confirmed that the notices were sent, including to their e-mail addresses, and others on the same lists did receive the notices. DOF received comments from Sealaska Timber Corporation and the Southeast Alaska Conservation Council (SEACC).</p> <p>Sealaska stated that the proposed regulations could be incorporated into existing harvest methods without undue cost or difficulty. SEACC generally supported the regulation changes but stated their disappointment with the Board’s decision not to ask for authority to address public safety. They also requested that indicators for “unstable slopes” be included in the regulations rather than the implementation handbook, and that the 1994 Chatwin et al. citation be included in the regulations. Consistent with prior Board discussions, DOF confirmed the decision to address “unstable slope” indicators through the implementation handbook and training, and to incorporate the Chatwin reference through training. Final regulations have been submitted to the DNR Commissioner for signature.</p>

Timeline of Meetings Addressing FRPA, Landslides, and Public Safety

October 9, 2007	Board of Forestry
Feb. 12-13, 2008	Board of Forestry
July 9, 2008	Board of Forestry Motion to convene a science and technical committee (S&TC) to review BMPs for preventing impacts to fish habitat and water quality
Nov. 12, 2008	Board of Forestry
Feb. 10, 2009	Science & Technical Committee - Scoping
March 19, 2009	Board of Forestry
April 1, 2009	Science & Technical Committee - Scoping
April 28, 2009	Science & Technical Committee - Scoping
July 16, 2009	Science & Technical Committee - Scoping
July 29, 2009	Science & Technical Committee - Scoping
Aug. 11-13, 2009	Board of Forestry including tour of landslide hazard areas on Prince of Wales Island. Direction to identify a menu of options both within and outside FRPA, recognizing past processes and principles used in developing the FRPA, identifying additional data needs, and recommending options to the Board.
Sept. 2009	Forest landowner review of scoping maps. DOF identification of sites including habitation.
Sept. 28, 2009	Science & Technical Committee - Scoping
Oct. 7-8, 2009	Board of Forestry Board request to retitle scoping maps Board request for AGO clarification of ability to restrict a safety amendment to landslides only.
March 17-18, 2010	Board of Forestry Helicopter harvesting video from Echo Cove Board motion to draft BMPs for review by the Board before deciding whether or not to proceed toward adopting them as regulations.
Aug. 25, 2010	Board of Forestry
Sept. 2, 2010	Science & Technical Committee – Phase 2 (BMP review)
Nov. 1, 2010	Science & Technical Committee – Phase 2 (BMP review)
Nov. 23, 2010	Science & Technical Committee – Phase 2 (BMP review)
Dec. 8, 2010	Science & Technical Committee – Phase 2 (BMP review)
Dec. 13-14, 2010	Board of Forestry Motions to convene an Implementation Group to determine how to best

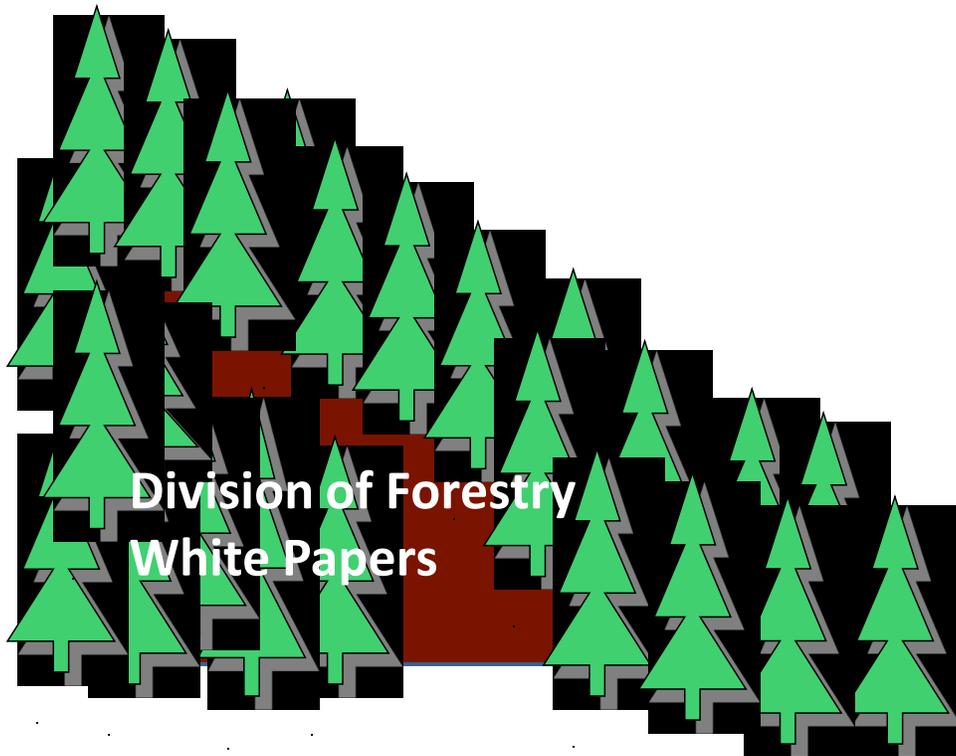
	implement the S&TC recommendations in a practical and effective manner.
January 31, 2011	Board of Forestry teleconference on legislation, including HB 91, introduced by Rep. Wilson to amend FRPA to address public safety
March 31-April 1, 2011	Board of Forestry
August 9, 2011	Implementation Group
August 23, 2011	Implementation Group
August 30-31, 2011	Board of Forestry Unanimous recommendation to leave language tying restriction on blasting under saturated soil conditions to likelihood of mass wasting occurring and damaging water quality.
September 27, 2011	Implementation Group
November 29-30, 2011	Board of Forestry – final review of Implementation Group recommendations. IG consensus recommendations were endorsed and forwarded for amendments to FRPA regulations, development of training programs, and updates to the BMP Implementation fieldbook (“purple book”)
March 20, 2012	Board of Forestry
November 8, 2012	Board of Forestry
March 26-27, 2013	Board of Forestry

Proposed regulations on forestry and mass wasting under 11 AAC 95.200-.900
JU2 2012 200 951
Public comments and agency responses
February 6, 2013

The DNR Division of Forestry received two comment letters on the proposed regulations, from Sealaska Timber Corporation and the Southeast Alaska Conservation Council. These comments were carefully considered by the Division and by the DEC Division of Water. The agencies paid special attention to the costs to private persons as required by AS 44.62.210(a). The comments were also evaluated in the context of the requirements for regulations adopted under the Forest Resources and Practices Act (AS 41.17.080). A summary of the comments and responses follows; copies of the comment letters are attached.

Commenter	Topic	Response
Sealaska Timber Corporation (STC)	The Division of Forestry (DOF) has largely succeeded in quantifying and mediating concerns over the potential for mass wasting during logging operations	Thank you for your comment
	STC can incorporate the proposed regulation amendments into existing harvest methods without much undue cost or difficulty	Thank you for your comment
	More restrictive use of unstable fill material in road construction will lead to more end hauling and increased cost, but the change is not overly significant	Thank you for your comment
	If overly applied, minimizing site disturbance could have more cost impact, STC will stay keenly involved with the practical interpretation and application of the amended regulations and bring any significant concerns to the attention of DOF.	We welcome the participation of STC and others in implementation of the regulations.
Southeast Alaska Conservation Council (SEACC)	We generally support the proposed regulation changes	Thank you for your support

<p>SEACC, cont.</p>	<p>We are disappointed that DOF and the Board of Forestry did not request a legislative change to the Forest Resources and Practices Act (FRPA) to address public safety concerns associated with landslides.</p>	<p>The Board of Forestry carefully considered the issue of whether to request a statutory change to FRPA to add authority to address public safety. The Board discussed this issue during 14 meetings between October 2007 and November 2011, visited hazard areas on Prince of Wales Island, and viewed video of helicopter harvest operations near Juneau. They also commissioned a Science & Technical Committee (S&TC) to assess the extent of landslide hazards associated with logging.</p> <p>The S&TC produced maps of likely hazard areas, land ownership, and past logging activity. The Board reviewed these maps and options for addressing public safety issue under other authorities.</p> <p>The Board unanimously determined in March 2010 that they did not want to expand FRPA from its focus on water quality and fish habitat to address public safety. They noted that landslides occur in hazard areas with and without logging, amending FRPA would only address one type of development that affects risk, amendments wouldn't prevent existing problems on Mitkof Island, and municipal governments are better suited to address the full suite of landslide hazard risks through zoning. The Board reviewed and reaffirmed this position in December 2010 and November 2011.</p> <p>The Board also issued a letter of support for a land exchange between the Alaska Mental Health Trust and the US Forest Service to resolve logging-related landslide hazard issues along the Mitkof Highway, the site that was the main focus of the public safety discussions.</p> <p>Copies of Board of Forestry minutes addressing this issue are available from the Division of Forestry.</p>
	<p>We support including indicators for identifying unstable slopes in 11 AAC 95.220 instead of the implementation fieldbook.</p>	<p>The proposed regulations include the indicators that the S&TC developed for identifying "unstable areas" in 11 AAC 95.220. The term "unstable slope" does not appear in 11 ACC 95.220, but it is used in other BMPs in the regulations, and is defined in 11 AAC 95.900. The list of indicators is not repeated in the "unstable slope" definition, but will be used in training for operators and agency staff as recommended by the S&TC and the stakeholder landslide standards implementation group (LSIG) that reviewed the draft regulations.</p>
	<p>We recommend including the reference to Chatwin, et al., 1994 in 11 AAC 95.220 for information on identifying dissected slopes.</p>	<p>The S&TC and the (LSIG) recommended use of the Chatwin paper to help operators identify dissected slopes that might have a high risk of mass wasting. The S&TC and LSIG did not specify that the citation be included in the regulations. This reference is included in the training program that was recommended by the LSIG and endorsed by the Board of Forestry. The Division of Forestry will develop and implement the training program in consultation with DEC following adoption of the regulations.</p>



White Paper #1:
Landslides, Public Safety, and the Alaska Forest Resources & Practices Act (FRPA)
For Discussion at the July 2008 Board of Forestry meeting
June 18, 2008

Background. The Mitkof Highway Homeowners Association (MHHA) requested that the FRPA be amended to address public safety hazards associated with slope failures. MHHA specifically requested the following addition to the FRPA:

“Activities that increase susceptibility to slope failures (such as logging) should be prohibited or restricted if slope failures pose a danger to life or property. Critical facilities, homes, and other buildings for human occupancy should not be located in areas susceptible to major slope failure.

The FRPA currently requires that adverse impacts of mass wasting be prevented or minimized, but its authority is limited to impacts on water quality and fish habitat. Forest practices acts in some states add public safety to the considerations for addressing mass wasting.

The MHHA concerns were initially based on proposed forest operations on Mitkof Island above the Mitkof Highway. Similar situations may exist in some other areas, but are limited to areas with a combination of commercial timber, steep topography, unstable soils, land ownership where logging may occur, and human occupancy. The occurrence of high-risk sites may increase as residential areas expand near past and current logging sites. Mass wasting risks associated with activities other than commercial timber harvesting are outside the authority of FRPA (e.g., utility lines, non-timber road construction, or other land clearing activities).

Current FRPA standards and best management practices (BMPs) regarding mass wasting. The Forest Resources & Practices Act and regulations include the following standards and BMPs.

- On state, municipal, and private land, significant adverse effects of mass wasting on water quality and fish habitat shall be prevented or minimized (AS 41.17.060(b)(5)).
- Include information on known unstable or slide-prone slopes, and site-specific erosion prevention measures in Detailed Plans of Operation (11 AAC 95.220(a)(9))
- A Change of Operations notification needs to be submitted for changes to proposed operations on unstable slopes (11 AAC 95.230(a)(1))
- In Region I, slope stability standards apply along anadromous waters and their tributaries. In these areas, operators must
 - Avoid constructing a road that will undercut the toe of a slope that has a high risk of slope failure;
 - Leave low-value timber where prudent along the riparian areas of tributaries to anadromous streams;
 - Use full or partial suspension yarding;
 - Fall timber away from streams in V-notches; and
 - Avoid sidecasting soil. (11 AAC 95.280)
- Avoid locating forest roads on slopes >67%, on unstable slopes, or in slide-prone areas. If avoidance is not feasible, site-specific measures must be approved by DOF and must
 - Balance cuts and fills, but not use fill that is unstable, fine-textured, or prone to mass wasting;
 - Minimize cuts in fine-textured soils;
 - Not bury log chunks, organic debris, or slash in the load-bearing portion of a road fill; and
 - Not excavate or blast during saturated soil conditions if mass wasting is likely to result and degrade water quality. (11AAC95.290(a), (b))
- Use end-hauling and full-bench construction if mass wasting is likely to occur and cause degradation of water quality. (11AAC95.290(d))

- Fell trees away from surface waters and standing waters, if not feasible remove tree and debris from surface waters (11AAC95.290(e), 11 AAC 95.355)
- Stabilize the slide path and exposed soils where mass wasting is caused by forest operations. (11AAC95.330)
- For a landing on a slope >67%, an unstable slope, or in a slide-prone area, keep fill material free of stumps and excessive slash, and compact fill to prevent mass wasting. A helicopter drop zone is considered a landing. (11AAC95.345(b)(4) and (d))
- Where feasible avoid crossing deep gullies where fine textured soils such as clay or ash soils exist (11 AAC 95.285(a)(9))
- Maintain bank integrity and prevent felled timber from entering surface waters (11 AAC 95.350).
- Design operation so yarding can be done in compliance with FRPA (11 AAC 95.340)
- Yarding up, down or across a V-notch channel must be accomplished in a manner that does not create significant erosion (11 AAC 95.360)
- Where downhill yarding is used, need to lift leading end and minimize downhill movement of slash and soils (11 AAC 95.360(c))
- Landowner shall reforest harvested land to the fullest extent practicable (11 AAC 95.375)
- "Mass wasting" is defined as the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity (11 AAC 95.900(44))

Other forest practices standards regarding mass wasting.

- Tongass National Forest: Standards and guidelines require
 - the same standards as FRPA for slopes >67% (see 11 AAC 95.290(a) above;
 - evaluation of potential mass wasting effects
 - case-by-case review and approval of harvesting on slopes $\geq 72\%$ based on an on-site analysis of slope and Class IV channel stability and potential impacts of accelerated erosion on fish habitat, other water uses, and other resources. The analysis should assess steepness, channel dissection, parent material, soil drainage, precipitation, and potential impacts. (Tongass Forest Plan, Jan. 2008, p. 4-65)
- Oregon State forest practices regulations include:
 - A screening process for identifying areas with high landslide hazards and exposed populations (OAR 629-623-0100) and categories for degrees of landslide potential and potential risk to public safety (OAR 629-623-0200 and -0300)
 - Guidelines for operations in different risk categories. In the areas with the highest slide potential and greatest public safety risk,
 - harvesting is not allowed unless "a geotechnical report demonstrates to the State Forester that any landslides that might occur will not be directly related to forest practices because of very deep soil or other site-specific conditions.
 - Operators must leave trees adjacent to high landslide hazard locations to reduce the likelihood of trees retained in these locations blowing down.
 - New road construction is prohibited. Road reconstruction is allowed if it will reduce landslide hazard. (OAR 629-623-0400)
 - Less restrictive requirements in areas with intermediate risks (OAR 629-623-0500 and -0550)
 - Along debris torrent-prone streams, a requirement to fell and yard in ways to minimize slash and other debris accumulation where there is substantial or intermediate public safety risk, remove slash from channels, and leave large standing trees along depositional reaches. (OAR 629-623-0600)
 - A requirement that operators submit a written plan for all timber harvesting or road construction in areas with intermediate or substantial public safety risk. (OAR-629-623-0700)

- Washington State has a State Environmental Policy Act (SEPA). SEPA gives state agencies the ability to condition or deny a proposal due to identified likely significant adverse impacts.
 - In areas with potentially unstable slopes or landforms, determination of whether a state environmental impact statement (SEIS) is required is based in part on “the likelihood of delivery of sediment or debris to any public resources, or in a manner that would threaten public safety” (WAC 222-10-030), and on whether the proposed harvest is consistent with an approved watershed analysis (WAC 222-16-050)
 - Specific mitigation measures must be designed to avoid accelerating rates and magnitudes of mass wasting that could threaten public safety. (WAC 222-10-030).
 - Definitions of potentially unstable slopes or landforms are provided. (WAC 222-16-050)
 - Guidelines for evaluating potentially unstable slopes and landforms are included. (2004 Board Manual).

Recommendations for Board discussion. The Division of Forestry recommends that the Board of Forestry convene a science and technical committee group to review the current mass wasting standards, and if appropriate, draft language for presentation to the Board of Forestry. The committee should consider the following items:

- Including public safety in the factors to consider for preventing or minimizing adverse impacts of mass wasting. This would require a statutory change.
- Defining the following terms and providing guidance for determining where these conditions exist:
 - “unstable or slide-prone slope”,
 - “slope that has a high risk of slope failure”
 - “fill material prone to mass wasting”.
 This would require a regulatory change.
- Providing guidance for determining where a public safety risk exists, e.g., combination of unstable slopes and human occupancy/use in potential slide path. This would require a regulatory change.
- Developing additional BMP(s) for harvesting and yarding methods in unstable or slide-prone areas. This would be a regulatory change.

DOF does not recommend adding language on location of structures to FRPA – FRPA applies only to commercial forestry operations.

A Science & Technical Committee would need to include representatives with expertise in the following areas and representatives of the state resource agencies responsible for implementing FRPA.

- Hydrology
- Geology
- Soil science
- Forest management
- Logging engineering
- Fish biology
- DNR Division of Forestry
- DEC Division of Water
- ADF&G Habitat Division

Recommendations from the Science & Technical Committee would be forwarded to the Board and, if appropriate, to an Implementation Group with representatives from state resource agencies, forest landowners, local governments, homeowners, and other affected interests.



White Paper #2:
**Updated paper on landslides, public safety, and the Alaska Forest Resources &
Practices Act (FRPA)**
For discussion at the March 17-18, 2010 Board of Forestry Meeting
January, 2010

In response to a request from the Board of Forestry, this document summarizes the history of the forest landslide and public safety issue in Alaska, the results of the geographic scoping process, existing FRPA standards regarding mass wasting, and approaches used in other west coast states, British Columbia, and the Tongass National Forest.

I. Background

In October, 2007, the Mitkof Highway Homeowners Association (MHHA) requested that the FRPA be amended to address public safety hazards associated with slope failures. MHHA specifically requested the following addition to the FRPA:

The FRPA currently requires that adverse impacts of mass wasting be prevented or minimized, but its authority is limited to impacts on water quality and fish habitat. Forest practices acts in some states have added public safety to the considerations for addressing mass wasting.

II. Scoping model and results

The MHHA concerns were initially based on proposed forest operations on Mitkof Island above the Mitkof Highway. The Board of Forestry asked for an assessment of the geographical extent of this issue.

The Landslide Science & Technical Committee developed a model and scoping maps to identify areas where risks may occur based on topography, forest cover, land management, and proximity to public roads and areas with residential or commercial buildings.

- The scoping maps are tools for assessing the general scope of landslide hazards and public safety risks associated with commercial timber harvesting subject to FRPA¹². They do not replace the need for site-specific analysis and design of timber sales and access roads.
- The scoping model is a first approximation based on available data of the geographic extent of potential landslide hazards in areas open to commercial timber harvest operations subject to FRPA where there is public use, in the portion of coastal Alaska from Cordova south.
- The accuracy of the model is limited by the detail of available Digital Elevation Models (DEMs) and the ability to model potential runout zones at a regional scale.
- The location of public safety hazards will change over time as patterns of public use, public road access, land ownership, timber harvesting and other land uses change.

The model and maps also incorporate site-specific modifications based on the local knowledge and best professional judgment of the Science and Technical Committee, the Committee's review of available digital orthophotos, and feedback from forest landowners and local governments.

¹² Mass wasting risks associated with activities other than commercial timber harvesting (e.g., utility lines, non-timber road construction, or other land clearing activities) are outside the authority of FRPA and are not addressed by the scoping model.

The scoping maps identify approximately 51,715 acres (0.2% of the study area) adjacent to public roads that meet the “potential hazard” criteria for steep slopes, forest cover, and availability for commercial harvesting. Of this total area, approximately 7,566 acres (0.03%) are adjacent to “populated areas” with residential or commercial buildings. The sites adjacent to populated areas include federal, state, municipal, trust, and other private land. Much of this land is within borough or first-class city boundaries where there is municipal authority for land use regulation. However, sites near Kasaan, Coffman Cove, Thorne Bay, Hollis, Whale Pass, Klawock Lake, and Port St. Nicholas are in the unorganized borough.

III. Current FRPA standards and best management practices (BMPs) regarding mass wasting.

A. Statutory authority

FRPA and its regulations include standards and BMPs to address impacts of erosion and mass wasting on fish habitat and water quality.

FRPA requires that on state, municipal, and private land, significant adverse effects of mass wasting on water quality and fish habitat shall be prevented or minimized (AS 41.17.060(b)(5)).

B. Regulations

FRPA includes the following best management practices (BMPs) in regulation:

- Include information on known unstable or slide-prone slopes, and site-specific erosion prevention measures in Detailed Plans of Operation (11 AAC 95.220(a)(9))
- A Change of Operations notification needs to be submitted for changes to proposed operations on unstable slopes (11 AAC 95.230(a)(1))
- In Region I, slope stability standards apply along anadromous waters and their tributaries. In these areas, operators must
 - Avoid constructing a road that will undercut the toe of a slope that has a high risk of slope failure;
 - Leave low-value timber where prudent along the riparian areas of tributaries to anadromous streams;
 - Use full or partial suspension yarding;
 - Fall timber away from streams in V-notches; and
 - Avoid sidecasting soil. (11 AAC 95.280)
- Avoid locating forest roads on slopes >67%, on unstable slopes, or in slide-prone areas. If avoidance is not feasible, site-specific measures must be approved by DOF and must
 - Balance cuts and fills, but not use fill that is unstable, fine-textured, or prone to mass wasting;
 - Minimize cuts in fine-textured soils;
 - Not bury log chunks, organic debris, or slash in the load-bearing portion of a road fill; and
 - Not excavate or blast during saturated soil conditions if mass wasting is likely to result and degrade water quality. (11AAC95.290(a), (b))
- Use end-hauling and full-bench construction if mass wasting is likely to occur and cause degradation of water quality. (11AAC95.290(d))
- Fell trees away from surface waters and standing waters, if not feasible remove tree and debris from surface waters (11AAC95.290(e), 11 AAC 95.355)
- Stabilize the slide path and exposed soils where mass wasting is caused by forest operations. (11AAC95.330)
- For a landing on a slope >67%, an unstable slope, or in a slide-prone area, keep fill material free of stumps and excessive slash, and compact fill to prevent mass wasting. A helicopter drop zone is considered a landing. (11AAC95.345(b)(4) and (d))

- Where feasible avoid crossing deep gullies where fine textured soils such as clay or ash soils exist (11 AAC 95.285(a)(9))
- Maintain bank integrity and prevent felled timber from entering surface waters (11 AAC 95.350).
- Design operation so yarding can be done in compliance with FRPA (11 AAC 95.340)
- Yarding up, down or across a V-notch channel must be accomplished in a manner that does not create significant erosion (11 AAC 95.360)
- Where downhill yarding is used, need to lift leading end and minimize downhill movement of slash and soils (11 AAC 95.360(c))
- Landowner shall reforest harvested land to the fullest extent practicable (11 AAC 95.375)
- "Mass wasting" is defined as the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity (11 AAC 95.900(44))

C. "Gaps" in FRPA standards for landslides

Statutory

- FRPA does not include public safety in the factors to consider for preventing or minimizing adverse impacts of mass wasting. This would require a statutory change.

Regulatory

Note: The following gaps exist currently and apply to prevention of impacts to fish habitat and water quality, as well as public safety.

- FRPA does not define the following terms nor does it provide guidance for determining where these conditions exist. Definitions would require a regulatory change.
 - "unstable or slide-prone slope",
 - "slope that has a high risk of slope failure"
 - "fill material prone to mass wasting".
- FRPA does not have BMPs for specific harvesting and yarding methods in unstable or slide-prone areas. This would be a regulatory change.
- FRPA does not have BMPs for helicopter operations or partial harvesting other than those noted above.

IV. Overview of other west coast forest practices standards regarding mass wasting

A. Tongass National Forest

Tongass National Forest standards and guidelines require

- the same standards as FRPA for slopes >67% (see 11 AAC 95.290(a) above;
- evaluation of potential mass wasting effects
- case-by-case review and approval of harvesting on slopes $\geq 72\%$ based on an on-site analysis of slope and Class IV channel stability and potential impacts of accelerated erosion on fish habitat, other water uses, and other resources. The analysis should assess steepness, channel dissection, parent material, soil drainage, precipitation, and potential impacts. (Tongass Forest Plan, Jan. 2008, p. 4-65)

B. State of Oregon

Oregon forest practices regulations include:

- A screening process for identifying areas with high landslide hazards and exposed populations (OAR 629-623-0100) and categories for degrees of landslide potential and potential risk to public safety (OAR 629-623-0200 and -0300)
- Guidelines for operations in different risk categories. In the areas with the highest slide potential and greatest public safety risk,
 - harvesting is not allowed unless “a geotechnical report demonstrates to the State Forester that any landslides that might occur will not be directly related to forest practices because of very deep soil or other site-specific conditions.
 - Operators must leave trees adjacent to high landslide hazard locations to reduce the likelihood of trees retained in these locations blowing down.
 - New road construction is prohibited. Road reconstruction is allowed if it will reduce landslide hazard. (OAR 629-623-0400)
- Less restrictive requirements in areas with intermediate risks (OAR 629-623-0500 and -0550)
- Along debris torrent-prone streams, a requirement to fell and yard in ways to minimize slash and other debris accumulation where there is substantial or intermediate public safety risk, remove slash from channels, and leave large standing trees along depositional reaches. (OAR 629-623-0600)
- A requirement that operators submit a written plan for all timber harvesting or road construction in areas with intermediate or substantial public safety risk. (OAR-629-623-0700)

C. State of Washington

Washington has a State Environmental Policy Act (SEPA). SEPA gives state agencies the ability to condition or deny a proposal due to identified likely significant adverse impacts.

- In areas with potentially unstable slopes or landforms, determination of whether a state environmental impact statement (SEIS) is required is based in part on “the likelihood of delivery of sediment or debris to any public resources, or in a manner that would threaten public safety” (WAC 222-10-030), and on whether the proposed harvest is consistent with an approved watershed analysis (WAC 222-16-050)
- Specific mitigation measures must be designed to avoid accelerating rates and magnitudes of mass wasting that could threaten public safety. (WAC 222-10-030).
- Definitions of potentially unstable slopes or landforms are provided. (WAC 222-16-050)
- Guidelines for evaluating potentially unstable slopes and landforms are included. (2004 Board Manual).

D. State of California

In California, a Timber Harvest Plan (THP) must be approved by the Dept. of Forestry and Fire Protection prior to harvest of live trees.

- A THP must include identify unstable areas and avoid or mitigate hazards in such areas.
- THPs must include estimated erosion hazard ratings by areas down to 20 acres, and down to 10 acres for areas with high/extreme hazard ratings.
- A Road Management Plan submitted as part of a THP must identify issues regarding public safety that could be affected by road management activities.
- The state review team for a THP includes an engineering geologist who reviews the plan with respect to slope stability, and inspects sites if necessary. One purpose of site inspections is to look for public safety hazards. The geologist can recommend additional measures to reduce hazards to public safety.

The California Forest Practices Act (2009) doesn’t directly address public safety, but actions under the FPA must be consistent with the California Environmental Quality Act, which does include public safety.

THPs are subject to interagency review and public hearings. THPs may not be approved until 35 days after filing unless the Director finds there will be no significant environmental damage or threat to public

safety with a shorter approval period. The Board of Forestry will grant a hearing on an appeal of a THP from the Dept. of Fish & Game or State Water Resources Control Board if there are substantial issues with respect to the environment or public safety involving threats to the lives, health, or property of state residents.

Use of heavy equipment for tractor operations is

- Prohibited on
 - slopes >65%
 - slopes >50% with a high or extreme erosion hazard rating
 - slopes >50% w/o flattening before reaching a watercourse or lake
- Limited to existing tractor roads that don't require reconstruction or THP-approved new tractor roads on slopes 50-65% with moderate erosion hazard rating
- Exceptions may be proposed in a THP with site-specific justification.

Mechanical timber harvesting (not including cable or helicopter yarding) shall not be conducted during a winter period (Nov. 15-April 1 in most areas) unless a winter period operating plan is incorporated in the THP and is followed, unless a Registered Professional Forester specifies the following winter operation measures in the THP:

- Tractor operations will be conducted only during dry, rainless periods where soils are not saturated,
- Erosion control structures are installed on all constructed skid trails and tractor roads prior to the end of the day if the U.S. Weather Service forecast is a "chance" (30% or more) of rain before the next day, and prior to weekend or other shutdown periods, and
- Site specific mitigation measures for erosion are established in riparian areas and unstable areas during THP preparation and review.

Decommissioned roads are inspected following the first bank-full storm event to ensure treatments are functioning to restore hillslope stability.

Sensitive watersheds may be identified for additional planning and protection measures. Designation as a sensitive watershed is based in part on risks to public safety.

E. Province of British Columbia

British Columbia's Forest and Range Practices Act covers tenuring (general licensing) for forest operations and permitting for individual harvest areas. Under the forest planning and practices regulations, a person carrying out a "primary forest activity" must ensure that the activity does not cause a landslide that adversely affects

- | | |
|------------------|-------------------------------|
| ▪ Soils | ▪ wildlife |
| ▪ visual quality | ▪ biodiversity |
| ▪ timber | ▪ recreation |
| ▪ forage | ▪ resource features |
| ▪ water | ▪ cultural heritage resources |
| ▪ fish | |

Primary forest activities are timber harvesting, silvicultural treatments, and road construction, maintenance, and deactivation.

The Minister of Forests and Range also has the power to intervene on any activity that is likely to have a catastrophic impact on public safety. The minister can stop the activity and require a remedy or mitigation.

V. Authorities for Public Safety

The Board also asked the general question, “Who is responsible for public safety?” Many entities have authorities for specific aspects of public safety. For example, at the state level, the following agencies have authority for certain aspects of public safety. Other local (e.g., municipalities under AS 29) and federal entities (e.g., OSHA, Federal Highway Administration, Homeland Security) also have public safety authorities.

- Dept. of Administration: motor vehicle safety responsibility act (AS 28.20)
- Dept. of Commerce, Community, and Economic Development, Division of Insurance: regulates insurance industry (AS 21), including responses to catastrophes
- Dept. of Labor & Workforce Development – workplace safety, accident prevention, building codes (AS 18.60)
- Dept. of Military & Veterans Affairs: homeland security and civil defense (AS 26.20)
- Dept. of Natural Resources: Alaska Seismic Hazards Safety Commission (AS 44.37.065); protection from wildland fire and other destructive agents (AS 41.15), retaining state land in hazardous areas (AS 38.04.015); zoning authority in the unorganized borough (AS 38.05.037);
- Dept. of Public Safety: protection of life and property, firearms, search & rescue, safety advisory council, state troopers, law enforcement training, structure fire prevention and protection, controlled substances... (AS 44.41; AS 17.30, AS 18.60, AS 18.65, AS 18.70)
- DOT&PF for highway safety (design, speed limits, etc.) (AS 19.10) and managing known avalanche sites that interface with the state transportation system.



White Paper #3: Update on Landslides and the Alaska Forest Resources & Practices Act (FRPA) For discussion at the August 23-25, 2010 Board of Forestry meeting May 2010

This document summarizes the history of Board of Forestry discussions concerning mass wasting and public safety with respect to the Forest Resources & Practices Act (FRPA), existing FRPA standards regarding mass wasting, and standards in other west coast states and provinces.

II. Background

In October, 2007, the Mitkof Highway Homeowners Association (MHHA) requested that the FRPA be amended to address public safety hazards associated with slope failures. MHHA specifically requested the following addition to the FRPA: *“Activities that increase susceptibility to slope failures (such as logging) should be prohibited or restricted if slope failures pose a danger to life or property. Critical facilities, homes, and other buildings for human occupancy should not be located in areas susceptible to major slope failure.*”

The Board of Forestry asked the Division of Forestry to convene a Science & Technical Committee (S&TC) to determine the geographic scope of the issue. That group included state agency staff experienced with the Forest Practices Act, USFS scientists in soils, geology, and hydrology, and a technical advisor from ADOT&PF. The group produced maps of the scoping model showing areas with potential for landslides in proximity to public roads or populated areas. The S&TC also put together a bibliography of relevant references, and a list of consensus points with respect to definitions and the hazard scoping process.

DOF also identified sites within these areas where past harvesting had occurred, identified existing authorities for public safety, and local government boundaries.

After reviewing this information, the Board decided against requesting a legislative change to FRPA to add in authority for public safety. However, they did request that DOF continue to work with the S&TC to review, and if appropriate update, FRPA landslide standards and definitions under the existing authority for protecting fish habitat and water quality.

III. Current FRPA standards and best management practices (BMPs) regarding mass wasting.

FRPA and its regulations include standards and BMPs to address impacts of erosion and mass wasting on fish habitat and water quality.

F. Statutory authority

FRPA requires that on state, municipal, and private land, significant adverse effects of mass wasting on water quality and fish habitat shall be prevented or minimized (AS 41.17.060(b)(5)).

FRPA requires that on state and municipal land only, there may not be significant impairment of the productivity of the land and water with respect to renewable resources (AS 41.17.060(c)(6)).

Regulations

FRPA includes the following best management practices (BMPs) in regulation:

- Include information on known unstable or slide-prone slopes, and site-specific erosion prevention measures in Detailed Plans of Operation (11 AAC 95.220(a)(9))
- A Change of Operations notification needs to be submitted for changes to proposed operations on unstable slopes (11 AAC 95.230(a)(1))
- In Region I, slope stability standards apply along anadromous waters and their tributaries. In these areas, operators must
 - Avoid constructing a road that will undercut the toe of a slope that has a high risk of slope failure;
 - Leave low-value timber where prudent along the riparian areas of tributaries to anadromous streams;
 - Use full or partial suspension yarding;
 - Fall timber away from streams in V-notches; and
 - Avoid sidecasting soil. (11 AAC 95.280)
- Avoid locating forest roads on slopes >67%, on unstable slopes, or in slide-prone areas. If avoidance is not feasible, site-specific measures must be approved by DOF and must
 - Balance cuts and fills, but not use fill that is unstable, fine-textured, or prone to mass wasting;
 - Minimize cuts in fine-textured soils;
 - Not bury log chunks, organic debris, or slash in the load-bearing portion of a road fill; and

- Not excavate or blast during saturated soil conditions if mass wasting is likely to result and cause degradation of water quality. (11 AAC 95.290(a), (b))
- Use end-hauling and full-bench construction if mass wasting is likely to occur and cause degradation of water quality. (11 AAC 95.290(d))
- Fell trees away from surface waters and standing waters; if not feasible remove tree and debris from surface waters (11 AAC 95.290(e), 11 AAC 95.355)
- Stabilize the slide path and exposed soils where mass wasting is caused by forest operations. (11AAC95.330)
- For a landing on a slope >67%, an unstable slope, or in a slide-prone area, keep fill material free of stumps and excessive slash, and compact fill to prevent mass wasting. A helicopter drop zone is considered a landing. (11AAC95.345(b)(4) and (d))
- Where feasible avoid crossing deep gullies where fine textured soils such as clay or ash soils exist (11 AAC 95.285(a)(9))
- Maintain bank integrity and prevent felled timber from entering surface waters (11 AAC 95.350).
- Design operation so yarding can be done in compliance with FRPA (11 AAC 95.340)
- Yarding up, down or across a V-notch channel must be accomplished in a manner that does not create significant erosion (11 AAC 95.360(b)(4))
- Where downhill yarding is used, need to lift leading end and minimize downhill movement of slash and soils (11 AAC 95.360(c)3))
- Landowner shall reforest harvested land to the fullest extent practicable (11 AAC 95.375)
- "Mass wasting" is defined as the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity (11 AAC 95.900(44))

“Gaps” in FRPA standards for landslides

FRPA does not define the following terms nor does it provide guidance for determining where these conditions exist. Definitions would require a regulatory change.

- “landslide”
- “unstable or slide-prone slope”
- “slope that has a high risk of slope failure”
- “fill material prone to mass wasting”

FRPA does not have BMPs for

- Specific harvesting and yarding methods in unstable or slide-prone areas.
 - A logging system must be appropriate for the terrain, soils, and timber type so that yarding or skidding can be accomplished in compliance with FRPA and its regulations, including felling, bucking, yarding, skidding, and reforestation. (11 AAC 95.340(a) and (b))
- Partial harvesting other than the following.
 - "Partial cut" means tree removal other than a clear cutting, such as removing only part of a stand. (11 AAC 95.900 (56))
 - If feasible, an operator shall fell a tree in a direction that minimizes damage to trees retained in a partial cut. (11 AAC 95.355(e)(2))
- Helicopter operations other than defining drop zones as landings (see above).

IV. Overview of other west coast forest practices standards regarding mass wasting

A. Tongass National Forest

Tongass National Forest standards and guidelines require

- the same standards as FRPA for slopes >67% (see 11 AAC 95.290(a) above;

- evaluation of potential mass wasting effects
- case-by-case review and approval of harvesting on slopes $\geq 72\%$ based on an on-site analysis of slope and Class IV channel stability and potential impacts of accelerated erosion on fish habitat, other water uses, and other resources. The analysis should assess steepness, channel dissection, parent material, soil drainage, precipitation, and potential impacts. (Tongass Forest Plan, Jan. 2008, p. 4-65)

B. State of Oregon

The Oregon forest practices act “provides for the overall maintenance” of air quality, water resources, soil productivity, fish, and wildlife. Landslide standards are based on categories of risk to public safety. The standards for areas with high landslide hazards but low public safety risk are regulated by OAR 629-623-0500, including the following:

- Prevent timber harvesting-related serious ground disturbance and drainage alterations on all high landslide hazard locations.
- Operators and the State Forester shall share responsibility to identify high landslide hazard locations.
- Operators shall not construct skid roads on high landslide hazard locations.
- Operators shall not operate ground-based equipment on high landslide hazard locations.
- Operators shall prevent deep or extensive ground disturbance on high landslide hazard locations during log felling and yarding operations.
- Operators concerned about the application of these standards to a specific operation may consult with the State Forester to obtain an evaluation of their harvesting plan and its likelihood of compliance with the standards.

Criteria to identify high landslide hazard locations are:

- The presence of any slope in western Oregon (excluding competent steep outcrops) $>80\%$, except in the Tyee Core area, where the threshold is 75%
- The presence of any headwall or draw in western Oregon $>70\%$, except in the Tyee Core Area, where the threshold in 65%
- Field identification of atypical conditions by a geotechnical specialist may be used to develop site-specific slope steepness thresholds for any part of the state where the hazard is equivalent to the above standards. The State Forester makes the final determination of “equivalent hazard”.

Additional restrictions apply to areas with high or intermediate risk to public safety.

Oregon may also require by rule, for operations adjacent to a small, nonfish-bearing stream subject to rapidly moving landslides that available green trees and snags be left in or adjacent to the stream. The operator must leave available green trees and snags under this paragraph within an area that is 50 feet on each side of the stream and no more than 500 feet upstream from a riparian management area of a fish-bearing stream.

C. State of Washington

Washington has a State Environmental Policy Act (SEPA). SEPA gives state agencies the ability to condition or deny a proposal due to identified likely significant adverse impacts.

- In areas with potentially unstable slopes or landforms, determination of whether a state environmental impact statement (SEIS) is required is based in part on “the likelihood of delivery of sediment or

debris to any public resources” (WAC 222-10-030), and on whether the proposed harvest is consistent with an approved watershed analysis (WAC 222-16-050)

- Definitions of potentially unstable slopes or landforms follow.
 - Inner gorges, convergent headwalls, or bedrock hollows with slopes steeper than 35 degrees (70%)
 - Toes of deep-seated landslides, with slopes steeper than 33 degrees (65%);
 - Ground water recharge areas for glacial deep-seated landslides;
 - Outer edges of meander bends along valley walls or high terraces of an unconfined meandering stream; or
 - Any areas containing features indicating the presence of potential slope instability which cumulatively indicate the presence of unstable slopes.
- Classification of specific sites are field verified by the department. (WAC 222-16-050).
- Guidelines for evaluating potentially unstable slopes and landforms are included. (2004 Board Manual).

G. State of California

In California, a Timber Harvest Plan (THP) must be approved by the Dept. of Forestry and Fire Protection prior to harvest of live trees.

- A THP must include identify unstable areas and avoid or mitigate hazards in such areas.
- THPs must include estimated erosion hazard ratings by areas down to 20 acres, and down to 10 acres for areas with high/extreme hazard ratings.
- A Road Management Plan submitted as part of a THP must identify issues regarding public safety that could be affected by road management activities.
- The state review team for a THP includes an engineering geologist who reviews the plan with respect to slope stability, and inspects sites if necessary. The geologist can recommend additional measures to reduce hazards.

THPs are subject to interagency review and public hearings. THPs may not be approved until 35 days after filing unless the Director finds there will be no significant environmental damage with a shorter approval period. The Board of Forestry will grant a hearing on an appeal of a THP from the Dept. of Fish & Game or State Water Resources Control Board if there are substantial issues with respect to the environment.

Use of heavy equipment for tractor operations is

- Prohibited on
 - slopes >65%
 - slopes >50% with a high or extreme erosion hazard rating
 - slopes >50% w/o flattening before reaching a watercourse or lake
- Limited to existing tractor roads that don't require reconstruction or THP-approved new tractor roads on slopes 50-65% with moderate erosion hazard rating
- Exceptions may be proposed in a THP with site-specific justification.

Mechanical timber harvesting (not including cable or helicopter yarding) shall not be conducted during a winter period (Nov. 15-April 1 in most areas) unless a winter period operating plan is incorporated in the THP and is followed, unless a Registered Professional Forester specifies the following winter operation measures in the THP:

- Tractor operations will be conducted only during dry, rainless periods where soils are not saturated,
- Erosion control structures are installed on all constructed skid trails and tractor roads prior to the end of the day if the U.S. Weather Service forecast is a "chance" (30% or more) of rain before the next day, and prior to weekend or other shutdown periods, and

- Site specific mitigation measures for erosion are established in riparian areas and unstable areas during THP preparation and review.

Decommissioned roads are inspected following the first bank-full storm event to ensure treatments are functioning to restore hillslope stability.

Sensitive watersheds may be identified for additional planning and protection measures.

H. Province of British Columbia

British Columbia's Forest and Range Practices Act covers tenuring (general licensing) for forest operations and permitting for individual harvest areas. Under the forest planning and practices regulations, a person carrying out a "primary forest activity" must ensure that the activity does not cause a landslide that adversely affects soils, visual quality, timber, forage, water, fish, wildlife, biodiversity, recreation, resource features, cultural heritage resources.

Primary forest activities are timber harvesting, silvicultural treatments, and road construction, maintenance, and deactivation.



White Paper #4: Landslides and the Alaska Forest Resources & Practices Act (FRPA) Background for the Implementation Group January 2011

This document summarizes the history of Board of Forestry discussions concerning mass wasting, public safety, and protection of fish habitat and water quality with respect to the Forest Resources & Practices Act (FRPA), existing FRPA standards regarding mass wasting, and standards in other west coast states and provinces.

V. Background

In October, 2007, the Mitkof Highway Homeowners Association (MHHA) requested that the FRPA be amended to address public safety hazards associated with slope failures. MHHA specifically requested the following addition to the FRPA: *“Activities that increase susceptibility to slope failures (such as logging) should be prohibited or restricted if slope failures pose a danger to life or property. Critical facilities, homes, and other buildings for human occupancy should not be located in areas susceptible to major slope failure.”*

II. Review process

The Board of Forestry asked the Division of Forestry to convene a Science & Technical Committee (S&TC) to determine the geographic scope of the issue. That group included state agency staff experienced with the Forest Practices Act, USFS scientists in soils, geology, and hydrology, and a technical advisor from ADOT&PF. The group produced maps of the scoping model showing areas with potential for landslides in proximity to public roads or populated areas. The S&TC also put together a

bibliography of relevant references, and a list of consensus points with respect to definitions and the hazard scoping process.

DOF also identified sites within these areas where past harvesting had occurred, identified existing authorities for public safety, and local government boundaries.

After reviewing this information, the Board decided against requesting a legislative change to FRPA to add in authority for public safety. However, they did request that DOF continue to work with the S&TC to review, and if appropriate update, FRPA landslide standards and definitions under the existing authority for protecting fish habitat and water quality.

The S&TC reconvened with two changes – a private sector specialist in helicopter logging was added, and the ADOT&PF technical advisor was dropped because the issues no longer focused on public roads. The S&TC met four times in Fall 2010. They

- updated and expanded the bibliography with references on landslide effects on fish habitat, effects of forest practices on landslide risk, links between soil disturbance and slope stability, and techniques for assessing landslide risk.
- Finalized definitions for “mass wasting”, “landslide,” “unstable slope or slide-prone area,” and “unstable fill material.”
- developed indicators for determining when “saturated soil conditions” exist on slopes, and
- recommended several changes to further strengthen the BMPs. Proposed changes address avoidance of soil disturbance, harvest and roading techniques, and blasting during saturated soil conditions in slide-prone areas.
- The S&TC did not reach consensus on one issue – the threshold for requiring end-haul and full-bench road construction methods under 11 AAC 95.290(d). They identified two options for this BMP.

In December 2010, the Board reviewed the S&TC recommendations and voted unanimously to forward them intact to an Implementation Group. The Implementation Group will recommend how to implement the S&TC recommendations in a practical and effective manner. An Implementation Group will include representative of state resource agencies, forest landowners, operators, and affected interests. The S&TC recommendations do not require any statutory changes, but may require regulatory updates. Any regulation changes would go through the standard public process for adopting regulations. Changes to the BMP implementation fieldbook and training needs are administrative tasks within DOF authority.

III. Current FRPA standards and best management practices (BMPs) regarding mass wasting.

FRPA and its regulations include standards and BMPs to address impacts of erosion and mass wasting on fish habitat and water quality.

A. Statutory authority

FRPA requires that on state, municipal, and private land, significant adverse effects of mass wasting on water quality and fish habitat shall be prevented or minimized (AS 41.17.060(b)(5)).

FRPA requires that on state and municipal land only, there may not be significant impairment of the productivity of the land and water with respect to renewable resources (AS 41.17.060(c)(6)).

B. Regulations

FRPA includes the following best management practices (BMPs) in regulation:

- Include information on known unstable or slide-prone slopes, and site-specific erosion prevention measures in Detailed Plans of Operation (11 AAC 95.220(a)(9))
- A Change of Operations notification needs to be submitted for changes to proposed operations on unstable slopes (11 AAC 95.230(a)(1))
- In Region I, slope stability standards apply along anadromous waters and their tributaries. In these areas, operators must
 - Avoid constructing a road that will undercut the toe of a slope that has a high risk of slope failure;
 - Leave low-value timber where prudent along the riparian areas of tributaries to anadromous streams;
 - Use full or partial suspension yarding;
 - Fall timber away from streams in V-notches; and
 - Avoid sidecasting soil. (11 AAC 95.280)
- Avoid locating forest roads on slopes >67%, on unstable slopes, or in slide-prone areas. If avoidance is not feasible, site-specific measures must be approved by DOF and must
 - Balance cuts and fills, but not use fill that is unstable, fine-textured, or prone to mass wasting;
 - Minimize cuts in fine-textured soils;
 - Not bury log chunks, organic debris, or slash in the load-bearing portion of a road fill; and
 - Not excavate or blast during saturated soil conditions if mass wasting is likely to result and cause degradation of water quality. (11 AAC 95.290(a), (b))
- Use end-hauling and full-bench construction if mass wasting is likely to occur and cause degradation of water quality. (11 AAC 95.290(d))
- Fell trees away from surface waters and standing waters; if not feasible remove tree and debris from surface waters (11 AAC 95.290(e), 11 AAC 95.355)
- Stabilize the slide path and exposed soils where mass wasting is caused by forest operations. (11AAC95.330)
- For a landing on a slope >67%, an unstable slope, or in a slide-prone area, keep fill material free of stumps and excessive slash, and compact fill to prevent mass wasting. A helicopter drop zone is considered a landing. (11AAC95.345(b)(4) and (d))
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- Yarding up, down or across a V-notch channel must be accomplished in a manner that does not create significant erosion (11 AAC 95.360(b)(4))
- Where downhill yarding is used, need to lift leading end and minimize downhill movement of slash and soils (11 AAC 95.360(c)3)
- Landowner shall reforest harvested land to the fullest extent practicable (11 AAC 95.375)
- "Mass wasting" is defined as the slow to rapid downslope movement of significant masses of earth material of varying water content, primarily under the force of gravity (11 AAC 95.900(44))

C. "Gaps" in FRPA standards for landslides regarding fish habitat and water quality

FRPA does not define the following terms nor does it provide guidance for determining where these conditions exist. Definitions would require a regulatory change.

- "landslide"
- "unstable or slide-prone slope"
- "slope that has a high risk of slope failure"

- “fill material prone to mass wasting”

FRPA does not have BMPs for

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 - A logging system must be appropriate for the terrain, soils, and timber type so that yarding or skidding can be accomplished in compliance with FRPA and its regulations, including felling, bucking, yarding, skidding, and reforestation. (11 AAC 95.340(a) and (b))
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IV. Overview of other west coast forest practices standards regarding mass wasting

A. Tongass National Forest

Tongass National Forest standards and guidelines require

- the same standards as FRPA for slopes >67% (see 11 AAC 95.290(a) above;
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- Operators concerned about the application of these standards to a specific operation may consult with the State Forester to obtain an evaluation of their harvesting plan and its likelihood of compliance with the standards.

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- The presence of any slope in western Oregon (excluding competent steep outcrops) >80%, except in the Tyee Core area, where the threshold is 75%
- The presence of any headwall or draw in western Oregon >70%, except in the Tyee Core Area, where the threshold is 65%
- Field identification of atypical conditions by a geotechnical specialist may be used to develop site-specific slope steepness thresholds for any part of the state where the hazard is equivalent to the above standards. The State Forester makes the final determination of “equivalent hazard”.

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Sensitive watersheds may be identified for additional planning and protection measures.

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Primary forest activities are timber harvesting, silvicultural treatments, and road construction, maintenance, and deactivation.



11 AAC 95.220(a)(9)(A) is amended to read:

(A) any known unstable **area; for the purposes of identifying unstable areas under this subparagraph, the operator shall consider sites with slopes generally in excess of 50 percent gradient, where one or more of the following indicators exist:**

(i) landslide scars;

(ii) jack-strawed trees;

(iii) gullied or dissected slopes;

(iv) a high density of streams or zero-order basins; in this subparagraph, "zero-order basin" means a source basin for a headwater stream;

(v) evidence of soil creep [OR SLIDE-PRONE SLOPE];

(Eff. 6/10/93, Register 126; am 11/20/99, Register 152; am 6/24/2004, Register 170; am 6/8/2007, Register 182; am 9/25/2013, Register 207)

Authority: AS 41.17.010 AS 41.17.080 AS 41.17.090
AS 41.17.055 AS 41.17.087 AS 41.17.900
AS 41.17.060

11 AAC 95.290(a) is amended to read:

(a) When constructing a forest road on a slope, an operator, where feasible, shall avoid locating a road on a slope greater than 67 percent **or** [,] on an unstable slope [, OR IN A SLIDE-PRONE AREA]. If avoiding that slope [OR AREA] is not feasible, site-specific measures must be planned to address slope instability due to road construction. The site-specific measures must be approved by the division and must meet the requirements of (b) of this section.

The lead-in language of 11 AAC 95.290(b) is amended to read:

(b) If constructing a road on a slope greater than 67 percent **or** [,] on an unstable slope [, OR IN A SLIDE-PRONE AREA] is necessary, an operator

...

11 AAC 95.290(b)(2) is amended to read:

(2) shall balance cuts and fills so that as much of the excavated material as is feasible is deposited in the roadway fill section; however, **unstable** fill material may not be used [IF IT IS UNSTABLE, FINE TEXTURED, OR PRONE TO MASS WASTING], and cuts must be minimized where fine textured soils are known or encountered; and

(Eff. 6/10/93, Register 126; am 6/24/2004, Register 170; am 6/8/2007, Register 182; am 9/25/2013, Register 207)

Authority: AS 41.17.010 AS 41.17.080 AS 41.17.098
AS 41.17.055

11 AAC 95.340 is amended by adding a new subsection to read:

(d) On unstable slopes, an operator shall consider one or more of the following:

- (1) partial cuts;
- (2) retention areas;
- (3) use of helicopter or skyline systems to achieve full suspension of logs;
- (4) other techniques to minimize disturbance to soils, understory vegetation, stumps, and

root systems. (Eff. 6/10/93, Register 126; am 9/25/2013, Register 207)

Authority: AS 41.17.010 AS 41.17.055 AS 41.17.080

11 AAC 95.345(b)(4) is amended to read:

(4) where slopes have a grade greater than 67 percent **or** [,] are unstable, [OR ARE IN A SLIDE-PRONE AREA,] fill material used in construction of a landing must be free from loose stumps and excessive accumulations of slash, and must be mechanically compacted in layers if necessary to prevent soil erosion and mass wasting;

(Eff. 6/10/93, Register 126; am 6/8/2007, Register 182; am 9/25/2013, Register 207)

Authority: AS 41.17.010 AS 41.17.055 AS 41.17.080

11 AAC 95.360(c) is amended by adding a new paragraph to read:

(6) on unstable slopes, an operator shall minimize disturbance to soils, understory vegetation, stumps, and root systems.

(Eff. 6/10/93, Register 126; am 9/25/2013, Register 207)

Authority: AS 41.17.010 AS 41.17.055 AS 41.17.080

11 AAC 95.365(a) is amended to read:

(a) A person may not skid timber or operate construction equipment or machinery

(1) in a water body catalogued as anadromous under AS 16.05.871, without written approval of the Department of Fish and Game;

(2) [, OR] in any other surface waters, marshes, or non-forested muskegs without prior notice to the division, except [,] that equipment may be operated on frozen surface waters, marshes, or non-forested muskegs without prior notice to the division; **or**

(3) on unstable slopes without prior notice to the division.

(Eff. 6/10/93, Register 126; am 6/24/2004, Register 170; am 9/25/2013, Register 207)

Authority: AS 41.17.010 AS 41.17.080 AS 41.17.098
AS 41.17.055

11 AAC 95.900 is amended by adding new paragraphs to read:

(96) "fine textured soil" means mineral soil with a texture of silty-clay, sandy-clay, or clay;

(97) "unstable fill material" means organic debris, organic soil, or fine textured soil;

(98) "unstable slope" means a slope exhibiting mass wasting or where mass wasting is likely to occur. (Eff. 2/15/81, Register 77; am 11/21/82, Register 84; am 6/10/93, Register 126; am 11/20/99, Register 152; am 6/24/2004, Register 170; am 6/8/2007, Register 182; am 12/27/2012, Register 204; am 9/25/2013, Register 207)

Authority: AS 41.15.050 AS 41.17.010 AS 41.17.080
AS 41.15.060 AS 41.17.055 AS 41.17.090
AS 41.15.090 AS 41.17.060 AS 41.17.900

Appendix A



Forest Resources & Practices Act
Landslide Bibliography



Compiled by FRPA Landslide Science/Technical Committee



Presented to the Alaska Board of Forestry

January 2011

Martha Welbourn Freeman, editor
Alaska Department of Natural Resources
Division of Forestry



**Forest Resources & Practices Act
Landslide Science & Technical Committee
ANNOTATED BIBLIOGRAPHY**

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Forest Resources & Practices Act

Landslide Bibliography

November 1, 2010

Introduction

This bibliography compiles published and unpublished research relevant to landslide hazards and public safety risks associated with commercial timber harvesting subject to FRPA. In Alaska, these hazards occur primarily in the portion of FRPA Region I (coastal forests) from Cordova south.

FRPA (AS 41.17) governs forestry operations on state, municipal, and private land. The Act is designed to protect fish habitat and water quality, while ensuring that management standards are workable for landowners and operators.

In 2008, the Alaska Board of Forestry requested that the Department of Natural Resources' Division of Forestry (DOF) address landslide hazards to public safety associated with commercial timber harvesting. DOF convened an interdisciplinary committee to do the science and technical review. The committee included scientists with expertise in soil science, geology, and hydrology, along with state agency staff experienced in forest management, road design and construction, and FRPA implementation.

This group, the Landslide Science & Technical Committee (LS&TC), was charged with assessing the geographic scope of landslide hazards to public safety associated with commercial timber harvesting regulated by FRPA, reviewing relevant literature, developing definitions for common landslide terms, and evaluating the FRPA best management practices for preventing and minimizing landslides and mass wasting.

Relevant publications included in prior FRPA bibliographies provided a foundation for the landslide bibliography. In addition, LS&TC members identified additional published documents and unpublished studies that expanded this work. The bibliography includes references on topics that are closely related to landslide risk, such as the effect of timber harvest on rainfall interception, which affects landslide response to timber harvesting. Committee members also annotated references that are commonly cited in Alaskan planning documents.

References are grouped by the geographic area in which the study occurred. The emphasis is on southeast Alaska. Relevant papers from other areas are also included, but the review of literature outside Alaska is not as exhaustive as that for literature focused within the state. Within the geographic groups, studies are listed in alphabetical order by the last name of the principal author, and by date, with the most recent papers by a principal author listed first. Documents marked with a star (★) are highlighted references that the Science & Technical Committee identified as especially relevant to the issue of landslide risks associated with commercial timber harvesting in coastal Alaska. These works generally build on earlier science, including many of the other listed references, and are frequently cited in Alaskan documents.

This document includes abstracts for the highlighted papers and many of the Alaskan papers. Abstracts for many of the other sources are available in the other bibliographical sources listed below.

Questions about this document may be directed to the DNR Division of Forestry, Forest Resources Program Manager, 555 W 7th Avenue, Anchorage, AK 99501 (907-269-8473).

Background and sources

This bibliography compiles information from four sources:

① A 2005 annotated bibliography of literature relevant to the Alaska Forest Resources & Practices Act, edited by Robert Ott, et al. The Ott bibliography includes abstracts for all references. A copy of information from the introduction to that bibliography follows.

② The slope stability section of a 2004 annotated bibliography prepared as part of the FRPA Region II riparian standards review, and edited by Chris Stark. Most, but not all references include abstracts prepared by the compiler. A copy of information from the introduction to that bibliography follows.

③ A 2003 summary of monitoring studies of the effectiveness of practices under FRPA from 1990-2002 compiled by Alison Arians. These references include a summary. A copy of information from the introduction to that bibliography follows.

④ Other publications collected by Landslide Science & Technical Committee members during the committee process. Abstracts have been prepared for some of the papers, including works that are frequently cited by Alaska planning documents. Particular recognition goes to Dennis Landwehr for compiling and annotating many of the references identified during the LS&TC process. Members of the LS&TC follow.

- Jim Baichtal USFS-Tongass National Forest, Geologist
- Bert Burkhart Columbia Helicopters
- Marty Freeman DNR Division of Forestry, Forest Resources Program Mgr.
- Kevin Hanley DEC Water Division, Environmental Program Specialist
- Adelaide Johnson USFS-PNW Forest Sciences Laboratory, Hydrologist
- Kyle Moselle ADF&G Habitat Division, Douglas Habitat Biologist
- Dennis Landwehr USFS-Tongass National Forest, Soil Scientist
- Pat Palkovic DNR Division of Forestry, SSE Forest Practices Forester
- Greg Staunton DNR Division of Forestry, Coastal Region Resource Mgr.
- Ralph Swedell DOT&PF SE Regl. Office, Regional Engineering Geologist



Excerpts from:

Relevant Literature for an Evaluation of the Effectiveness of the Alaska
Forest Resources and Practices Act: An Annotated Bibliography

Compiled by:

Robert A. Ott, Ph.D.
Alaska Department of Natural Resources, Division of Forestry, and
the Tanana Chiefs Conference Forestry Program
Fairbanks, Alaska

Angie K. Ambourn, M.S.
USDA Forest Service, Alaska Region, State and Private Forestry
Forest Health Protection
Fairbanks, Alaska

Fabian Keirn
Tanana Chiefs Conference Forestry Program
Fairbanks, Alaska

Alison E. Arians, Ph.D.
Alaska Department of Natural Resources, Division of Forestry
Anchorage, Alaska

January 2005

Each abstract is identified as being an author abstract, an electronic abstract, or a compiler abstract. Author abstracts were copied verbatim from journal articles and reports that were available to us, or from electronic abstracts that were posted on websites of individual peer-reviewed journals. In a few instances, a report did not contain an abstract, but a summary, introduction, or conclusions section contained information that was adequate for summarizing the described project. In these cases, the appropriate sections were copied verbatim and labeled as an author abstract as well. Electronic abstracts are those which were obtained from the electronic key word search of the article databases identified above. From experience, we knew that many of these abstracts were not complete author abstracts, so we did not want to identify them as such. Compiler abstracts are those that were written by the compilers of this bibliography for those reports that did not contain an abstract or a suitable introduction, summary, or conclusions section.

②

Excerpts from:

Section 4

FORESTRY SLOPE AND STABILITY

An Annotated Bibliography

Compiled for the

Region II FRPA Riparian Management Science & Technical Committee

by

Chris Stark

University of Alaska, Fairbanks and Bering Sea Fisherman's Association

July 2004

The Region II Forest Practices Riparian Management Science and Technical Committee Literature Review and Annotated Bibliography compiles published research relevant to riparian management issues in the boreal and transitional forests of southcentral Alaska. Region II covers the Matanuska and Susitna valleys, the non-coastal part of the Copper River Basin, the western Kenai Peninsula, and the west side of Cook Inlet north of Mt. Douglas.

Volunteers from Committee conducted a broad search of publications on each topic. References for publications relevant to conditions in Region II were collected and annotated, and an introduction compiled for each section. The bibliographies and introductions were submitted to the full committee for review and editing. This document compiles the ten review topics.

③

**Summary of Monitoring Studies of the Effectiveness of
Practices under the Alaska Forest and Resources
Practices Act
1990-2002**

**Compiled by Alison Arians
DNR Division of Forestry**

April 2003

A report funded by the Alaska Coastal Management Program, Office of the Governor, pursuant to National Oceanic and Atmospheric Administration Award No. NA17OZ1113. The views expressed herein are those of the author and do not necessarily reflect the views of NOAA. This report is intended to provide a brief overview of effectiveness monitoring studies done with respect to activities under the current Alaska Forest Resources and Practices Act. It is not a review of the broad literature on riparian management, nor does it cover studies done with respect to federal best management practices for national forest land.

COASTAL ALASKA (FRPA Region I)

This section includes references from studies in FRPA Region I, the coastal temperate rainforest region of Alaska.

④ Adams P.W. and R.C. Sidle. 1987. Soil conditions in Three Recent Landslides in southeast Alaska. *For. Ecol. Manage.* 18 (1987) 97-102.

Compiler abstract.

- Soil conditions were highly variable within and between landslides.
- Organic matter was present in relatively high level and it's contribution was from mixing of soils and from sloughing of adjacent soils.
- Due to highly variable soil conditions and presence of bedrock outcrops in the scour zone, revegetation and growth are likely to be highly variable among landslides and even within the scour or deposit area of a given landslide.

④ Barr, D.J. and D.N. Swanston. 1970. Measurement of creep in shallow, slide-prone till soil. *Am. J. Sci.* 269: 467-480, illus.

Compiler abstract.

- Authors measured soil creep with strain probes and paraffin rods in the Maybeso Valley in Karta soils.
- Soil creep was measurable in the upper weather layer of the till from 0.15 to 0.457 meters deep.
- Soil creep is estimated to be on the magnitude of .0064 meters per year at the surface.
- Movement occurred throughout the year but the highest rates of movement were in the spring and fall when soil moisture contents were highest.
- The rate of creep measured was smaller than anticipated.

② Bishop, D.M. and M.E. Stevens. 1964. Landslides on logged areas in southeast Alaska. U.S. Dept. Agric., Northern Forest Experiment Station Res. Pap. NOR-1.

Compiler abstract: Describes and tentatively analyzes landslides on timbered slopes of mountainous southeast Alaska. Vegetation below timberline is mainly western hemlock and Sitka spruce. Recent large-scale clearcut logging of timber has accelerated avalanches and flows on steep slopes. This paper identified a 4.5 fold increase in the number of landslides in logged versus unlogged areas on Prince of Wales and Northern Revilla Island.

④ Burke, D. 1983. Harvesting on slopes over 75 Percent. Prepared for the USDA For. Serv. Region 10 Juneau, Alaska. Contract #53-010901000087. Doyle Burke principal investigator. Pan Sylvan Seattle-Ketchikan. 14 June 1983.

Compiler abstract.

- Reviewed literature to date and affirmed that it is appropriate to avoid timber harvest on slopes over 75% in southeast Alaska.

- Author described need to minimize soil disturbance, road disturbance and vegetative disturbance when planning yarding systems on steep slopes. Ground-lead and Hi-lead are inappropriate, partial or full suspension are the preferred yarding methods. Minimize roads on steep slopes and go to longer span cable systems.

④ Erdman, C. F., and G. W. McNelly. 2006. **Geotechnical forest practices evaluation – Petersburg slope stability assessment, Petersburg, Alaska. File No. 5242-004-00. 20 pp. + photo appendices.**

④ Gier, J. 2000. **Mechanics Driving Landslide Occurrence in the Margaret Lake Basin (1995 to 1999). Tongass National Forest Ketchikan-Misty Ranger District March 24, 2000. unpublished report.**

Compiler abstract.

- Inventory and analysis of 19 landslides in the Margaret Lake basin attempted to answer 8 questions posed by the District Ranger.
- Identified heavy precipitation, including rain-on-snow events as contributing to the Margaret landslides.
- Found that most slides were related to harvest units and road drainage problems, only two of the slides initiated in unharvested areas.
- Found that harvest practices (in the past) in the Margaret watershed were not entirely consistent with 1997 Tongass Land Management Plan BMPs.

④ Gomi, T., Johnson, A.C., Deal, R.L., Hennon, P.E., Orlikowska, E.H., and Wipfli, M.S., 2006. Mixed red alder-conifer riparian forests of southeast Alaska, Implications for the accumulations of woody debris, organic matter, and sediment in headwater streams. *Canadian Journal of Forest Research*, 36(3):325-737

① Gomi, T., R.C. Sidle, and D.N. Swanston. 2004. Hydrogeomorphic linkages of sediment transport in headwater streams, Maybeso Experimental Forest, southeast Alaska. *Hydrological Processes* 18: 667-683.

Author abstract: Hydrogeomorphic linkages related to sediment transport in headwater streams following basin wide clear-cut logging on Prince of Wales Island, southeast Alaska, were investigated. Landslides and debris flows transported sediment and woody debris in headwater tributaries in 1961, 1979, and 1993. Widespread landsliding in 1961 and 1993 was triggered by rainstorms with recurrence intervals (24 h precipitation) of 7.0 years and 4.2 years respectively. Occurrence, distribution, and downstream effects of these mass movements were controlled by landform characteristics such as channel gradient and valley configuration. Landslides and channelized debris flows created exposed bedrock reaches, log jams, fans, and abandoned channels. The terminus of the deposits did not enter main channels because debris flows spread and thinned on the unconfined bottom of the U-shaped glaciated valley. Chronic sediment input to channels included surface erosion of exposed till (rain splash, sheet erosion, and freeze-thaw action) and bank failures. Bedload sediment transport in a channel impacted by 1993 landslides and debris flows was two to ten times greater and relatively finer compared with bedload transport in a young alder riparian channel that had last experienced a landslide and debris flow in 1961. Sediment transport and storage were influenced by regeneration of riparian vegetation, storage behind recruited woody debris, development of a streambed armour layer, and the decoupling of hillslopes and channels. Both spatial and

temporal variations of sediment movement and riparian condition are important factors in understanding material transport within headwaters and through channel networks.

① **Gomi, T., R.C. Sidle, R.D. Woodsmith, and M.D. Bryant. 2003. Characteristics of channel steps and reach morphology in headwater streams, southeast Alaska. *Geomorphology* 51: 225-242.**

Author abstract: The effect of timber harvesting and mass movement on channel steps and reach morphology was examined in 16 headwater streams of SE Alaska. Channel steps formed by woody debris and boulders are significant channel units in headwater streams. Numbers, intervals, and heights of steps did not differ among management and disturbance regimes. A negative exponential relationship between channel gradient and mean length of step intervals was observed in the fluvial reaches (<0.25 unit gradient) of recent landslide and old-growth channels. No such relationship was found in upper reaches (≥ 0.25 gradient) where colluvial processes dominated. Woody debris and sediment recruitment from regenerating riparian stands may have obscured any strong relationship between step geometry and channel gradient in young alder, young conifer, and recent clear-cut channels. Channel reaches are described as pool-riffles, step-pools, step-steps, cascades, rapids, and bedrock. Geometry of channel steps principally characterized channel reach types. We infer that fluvial processes dominated in pool-riffle and step-pool reaches, while colluvial processes dominated in bedrock reaches. Step-step, rapids, and cascade reaches occurred in channels dominated by both fluvial processes and colluvial processes. Step-step reaches were transitional from cascades (upstream) to step-pool reaches (downstream). Woody debris recruited from riparian corridors and logging activities formed steps and then sequentially might modify channel reach types from step-pools to step-steps. Scour, runout, and deposition of sediment and woody debris from landslides and debris flows modified the distribution of reach types (bedrock, cascade, and step-pool) and the structure of steps within reaches.

① **Gomi, T., R.C. Sidle, M.D. Bryant, and R.D. Woodsmith. 2001. The characteristics of woody debris and sediment distribution in headwater streams, southeastern Alaska. *Canadian Journal of Forest Research* 31: 1386-1399.**

Author Abstract: Large woody debris (LWD), fine woody debris (FWD), fine organic debris (FOD), and sediment deposition were measured in 15 steep headwater streams with five management and disturbance regimes. Clear-cut channels logged in 1995 contained large accumulations of logging residue that initially provided sites for sediment storage. Half of the LWD in clear-cut channels was recruited during and immediately after logging. Woody debris from logging activities remains in young growth conifer channels 37 years after logging. Numbers of LWD in clear-cut and young conifer channels were significantly higher than in old-growth channels, although numbers of FWD pieces were not significantly different because of higher recruitment from old-growth stands. Channels that experienced recent (1979 and (or) 1993) and earlier (1961 and (or) 1979) scour and runout of landslides and debris flows contained less LWD and FWD, although large volumes of LWD and FWD were found in deposition zones. The volumes of sediment stored in young alder and recent landslide channels were higher than in the other channels. Because of the recruitment of LWD and FWD from young alder stands, the ratio of sediment stored behind woody debris to total sediment volume was higher in young alder channels compared with recent landslide channels. Numbers of LWD and FWD pieces in all streams were significantly correlated with the volumes of sediment stored behind woody debris. Timber harvesting and soil mass movement influence the recruitment, distribution, and accumulation of woody debris in headwater streams; this modifies sediment storage and transport in headwater channels.

④ Hartsog, W. 1990. **Summary of Slope Stability and Related Problems on the Tongass National Forest. Unpublished white paper. October, 1990.**

Compiler abstract.

- Author reviewed numerous landslides associated with road construction and timber harvest.
- Recommended road locations to avoid steep slopes.
- Full bench and end-haul may be needed in some areas.
- Timing of pioneer road construction and subsequent blasting and deposition of rock embankment could have prevented some road related failures.
- Identified a need for long-range planning on timber sales.

④ Johnson, A.C. Edwards, R. and Erhardt, R., 2008, Reply to discussion by Amod S. Dhakal and Roy C.Sidle: “Ground water response to forest harvest: Implications for hillslope stability”, *Journal of American Water Resources Association*, 44(4):1062-1065.

★ ④ Johnson A.C., R.T. Edwards, and R. Erhardt. 2007. Ground-water Response To Forest Harvest: Implications for Hillslope Stability. *Journal of American Water Resources Association*, 43(1):134-147.

Compiler abstract.

- Authors studied ground-water response to timber harvest using wells in the alternatives to clearcutting study sites.
- The influence of timber harvest varied greatly with location and local site characteristics.
- One site showed statistically significant maximum soil saturation increases of 0.14, 0.12, and 0.11 following 100%, 75%, and 25% harvest ($p < 0.05$).
- At the chosen field sites the differences in saturation did not dramatically affect hillslope stability, but could do so in nearby areas with greater slope and/or greater soil depth.

④ Johnson, A.C. and Edwards, R.T. 2002. Physical and chemical processes in headwater channels with red alder. In: Johnson, A.C., Haynes, R.W., Monserud, R.A, (eds). *Congruent Management of Multiple Resources: Proceedings from the Wood Compatibility Workshop. Gen. Tech. Rep. PNW-GTR-563.* Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 101-108.

① Johnson, A.C., and P. Wilcock. 2002. Association between cedar decline and hillslope stability in mountainous regions of southeast Alaska. *Geomorphology* 46: 129-142.

Author abstract: Old-growth forests experiencing widespread decline of yellow-cedar (*Chamaecyparis nootkatensis*) in southeast Alaska have a 3.8-fold increase in the frequency of landslides. We report here on an investigation of the cause of this increased slope instability. Time since death of cedar was assessed using surveys around landslide sites. Root decay on dead trees was used to estimate the decline in the apparent soil strength provided by roots. Changes in soil hydrology were measured with 120 piezometers located in areas of healthy cedar, healthy spruce/hemlock, and sites with cedar decline. Relative influences on slope stability by changes in soil moisture and root strength were evaluated with a simple stability model. At most sites, soil depth is < 0.7 m, and the loss of root strength has an important and

possibly dominant influence on slope instability. In soils deeper than 1 m, changes in pore pressure have a proportionately larger influence on slope stability. Landslides appear most likely when cedar decline reaches snag class IV (approximately 50 years after tree death), when most of the cedar root strength is lost and root strength from secondary growth has yet to develop.

★ ① **Johnson, A.C., D.N. Swanston, and K.E. McGee. 2000. Landslide initiation, runout, and deposition within clearcuts and old-growth forests of Alaska. Journal of the American Water Resources Association 36: 17-30.**

Electronic Abstract: More than 300 landslides and debris flows were triggered by an October 1993 storm on Prince of Wales Island, southeast Alaska. Initiation, runout, and deposition patterns of landslides that occurred within clearcuts, second-growth, and old-growth forests were examined. Blowdown and snags, associated with cedar decline and "normal" rates of mortality, were found adjacent to at least 75 percent of all failures regardless of land use. Nearly 50 percent of the landslides within clearcuts occurred within one year following timber harvest; more than 70 percent of these sites had hydrophytic vegetation directly above failures. In following the runout paths of failures, significantly more erosion per unit area occurred within clearcuts than in old-growth forests on slopes with gradients from 9 to 28 degree (16 to 54 percent). Runout length, controlled by hillslope position within deglaciated valleys, was typically longer in old-growth forests than in second growth and clearcuts (median values were 334, 201, and 153 m, respectively). Most landslides and debris flows deposited in first- and second-order channels before reaching the main stem channels used by anadromous fish. Slide deposits in old-growth forests were composed of a higher proportion of woody debris than deposits derived from slides in second growth or clearcuts.

④ **Karl, Susan M.; Haeussler, Peter J.; McCafferty, Anne E., 1999, Reconnaissance Geologic Map of the Duncan Canal-Zarembo Island Area, Southeastern Alaska. Open-File Report 99-168, Map Sheet: 54 x 36 inches; Pamphlet: 30 p.**

Author abstract. The geologic map of the Duncan Canal-Zarembo Island area is the result of a multidisciplinary investigation of an area where an airborne geophysical survey was flown in the spring of 1997. The area was chosen for the geophysical survey because of its high mineral potential, a conclusion of the Petersburg Mineral Resource Assessment Project, conducted by the U.S. Geological Survey from 1978 to 1982. The City of Wrangell, in southeastern Alaska, the Bureau of Land Management, and the State of Alaska provided funding for the airborne geophysical survey. The geophysical data from the airborne survey were released in September 1997. The U.S. Geological Survey conducted field investigations in the spring and fall of 1998 to identify and understand the sources of the geophysical anomalies from the airborne survey. This geologic map updates the geologic maps of the same area published by David A. Brew at 1:63,360 (Brew, 1997a-m; Brew and Koch, 1997). This update is based on 3 weeks of field work, new fossil collections, and the geophysical maps released by the State of Alaska (DGGS, Staff, and others, 1997a-o). Geologic data from outcrops, fossil ages, radiometric ages, and geochemical signatures were used to identify lithostratigraphic units. Where exposure is poor, geophysical characteristics were used to help control the boundaries of these units. No unit boundaries were drawn based on geophysics alone. The 7200 Hertz resistivity maps (DGGS, Staff, and others, 1997k-o) were particularly helpful for controlling unit boundaries, because different stratigraphic units have distinctive characteristic conductive signatures (Karl and others, 1998). Increased knowledge of unit ages, unit structure, and unit distribution, led to improved understanding of the nature of unit contacts. Northwest- to southwest-directed thrust faults, particularly on Kupreanof Island, are new discovery. Truncated faults and map patterns suggest there were at least 2 generations of thrusting, and that the thrust faults have been folded. Subsequent right-lateral strike-slip NW-SE faults, have offset thrust faults, and

these in turn are offset by N-S right-lateral strike-slip faults. Our fieldwork raised as many questions as it answered, and we see this map as a progress report at a reconnaissance level. The main contributions of this map are 1) the greater distribution of Triassic rocks, 2) increased fossil age information, and 3) the identification of thrust faults within and between units. <http://pubs.usgs.gov/of/1999/of99-168/>

★ ④ Landwehr D.J. 1999. **The Inventory and Analysis of Landslides Associated with the 89-94 KPC LTS Units and Roads on the Thorne Bay Ranger District. Ketchikan Area Watershed Group. February, 1999. Final. unpublished monitoring report.**

Author abstract.

- The author took field measurements of all landslides associated with timber harvest and road construction completed as part of the implementation of the 89-94 KPC operating period on the Thorne Bay Ranger District. Implementation of the project took 6 years and the inventory was completed with an aerial survey of all harvest units and roads in 1998.
- The inventory includes 162 landslides, 54 of which occurred during the October 1993 storm event. The average size of landslides associated with timber harvest activities is about 0.5 acres.
- The average initiation angle during the 1993 storm event was 71% versus the average initiation angle for all other slides was 77 percent. This is significant at the 70 percent probability level.
- Sixty of the 162 slides were associated with 222 miles of road construction. Forty-seven of the road and rock pit related slides occurred during construction or pit development.
- The 162 landslides covered 76.4 acres of land. The associated timber harvest covered 18,429 acres and 222 miles of road construction. The slides impacted 0.4 percent of the land harvested.

★ ④ Landwehr D. J. 1998. **The Effectiveness of Standards and Guidelines in Preventing Additional Mass Movement. An 89-94 KPC FEIS Monitoring Report. Ketchikan Area Watershed Group. Final February, 1998. unpublished monitoring report.**

Author abstract.

- The author used multiple sets of air photos taken every 5 years to conduct a comprehensive landslide inventory for the 89-94 Long-term timber sale operating period. The landslide inventory spans a 20 year time frame from 1971 to 1991. No field measurements were taken, landslide size was scaled from topographic maps. Landslide analysis was conducted for the 20 year time period and each five year time period within the 20 years.
- The frequency of landslides in harvested areas is higher than the frequency of landslides in unharvested areas for all time periods.
- The frequency of landslides harvested areas in the most recent time period (1985 to 1991) is less than all previous time period, even though timber harvest is progressively occurring on steeper slopes.
- The average age of second-growth in which landslides occurred between 1975 and 1991 is 9 to 13 years.
- Current timber harvest (late 1990s) is occurring on steeper ground than any previous operating period.
- The average size of 541 landslides in unharvested commercial forest land is 3.1 acres.
- The average size of 197 landslides occurring in second-growth is 0.6 acres.
- The average size of 55 road and rock pit related landslides is 0.55 acres.
- On average, over the 20 year time period one landslide was caused per 19 miles of road construction.
- On average, one landslide occurred in 6,239 acres of unharvested commercial forest land over the 20 year time period. This equates to one landslide per 124, 788 acres of unharvested commercial forest land per year.

- On average, one landslide occurred in 1,373 acres of harvested areas per 20 years. This equates to one landslide per 27,467 acres of harvested land per year.
- Landslides in harvested areas at a rate 4.5 times that of unharvested areas over the 20 year time period.

④ Landwehr D. J. 1994. **Inventory and Analysis of Landslides Caused by the October 25, 26, 1993 Storm event on the Thorne Bay Ranger District. Ketchikan Area Watershed Group. January 10, 1994. Unpublished report.**

Author abstract.

- The author documented 140 landslides (through aerial survey) as the result of a single storm event.
- Frequency analysis showed more slides occurred in recently harvested areas than in unharvested areas or in areas of older second-growth.
- Older second-growth (8 to 30 years old) had more landslides per unit area than stands less than 8 years old but more landslides than unharvested (old-growth).
- The author recognized the possibility of not detecting small landslides under the forest canopy and analyzed landslide frequencies with and without small landslides.
- Landslides in recently harvested areas were smaller than landslides in unharvested areas and in second-growth.

④ Lemke, R.W., 1975, **Reconnaissance engineering geology of the Ketchikan area, Alaska, with emphasis on evaluation of earthquake and other geologic hazards. U.S. Geol. Survey Open-File Report 75-250, p. 65.**

<http://www.dggs.dnr.state.ak.us/pubs/pubs?reqtype=citation&ID=11073>

④ Lemke, R.W., 1974, **Reconnaissance Engineering Geology of the Wrangell area, Alaska, with Emphasis on Evaluation of Earthquake and Other Geologic Hazards. US Geological Survey, Open-File Report 74-1062, pp. 19-27.**

<http://www.dggs.dnr.state.ak.us/pubs/pubs?reqtype=citation&ID=11017>

④ Landwehr, D. J. and G. Nowacki. 1999. **Summary of statistical review of Ketchikan Area soil disturbance. Unpubl.**

④ Lemke, R.W. and L.A. Yehle, 1972a, **Reconnaissance Engineering Geology of the Haines Area, Alaska, with Emphasis on elevation of Earthquake and other Geologic Hazards. US Geological Survey, Open-File Report 72-229, 109p.**

<http://www.dggs.dnr.state.ak.us/pubs/pubs?reqtype=citation&ID=10950>

④ Lemke, R.W. and L.A. Yehle, 1972b, **Regional and other general factors bearing on evaluation of earthquake and other geologic hazards to coastal communities of southeastern Alaska. U.S. Geological Survey open-file report 72-230, 99 p.**

<http://www.dggs.dnr.state.ak.us/pubs/pubs?reqtype=citation&ID=10951>

③ Martin, D.J. 1996b. Monitoring the effects of timber harvest activities on fish habitat in streams of coastal Alaska. 1997 Status Report, 1992-1997.

Compiler abstract: Results:

- 55% of landslides (in both managed and unmanaged forests) delivered coarse sediment to headwater or larger stream channels.
- 67% of landslides from unmanaged forests reached stream channels (unstable steep areas).
- 12% of clearcut/road landslides reached channels.
- 45% of the landslides originated above timberline.
- Clearcuts and roads were 11% of landslides, but only 2% of the landslides that reached stream channels.
- Low gradient channels in basins with high sediment influx responded to sediment load: channel migration, braiding, bar formation.

Further Study Recommendations:

- Future studies will link these results to fish habitat. Further studies will examine relationships between sediment supply, pool development, and spawning gravel conditions.
- Field observations may be required to determine sediment delivery and landslide activity in some areas where aerial photographic evidence is inconclusive.

③ Martin, D.J., and J.A. Kirtland. 1995. An assessment of fish habitat and channel conditions in streams affected by debris flows at Hobart Bay. Project 16-004 report written by Pentec Environmental, Inc., Edmonds, Washington. Written for Goldbelt, Inc., Juneau, Alaska. 40pp. plus Appendix.

Compiler abstract: Background:

- In 1993, several debris flows occurred in basins flowing into Hobart Bay. Three debris flows were triggered by forest practices activities (roads and clearcuts) on steep and unstable slopes. Sediment went into Gypo Creek.
- Two debris avalanches were initiated by natural causes: Nancy Creek and Salt Chuck Creek basins. The avalanches became debris flows passing through clearcuts and depositing sediment.
- 1994, they were on the list of impaired water bodies (EPA 303(d) list).

Results:

- 26 landslides: 13 delivered sediment. 6 originated in harvest areas. Most were in steep inner gorges along channels.
- Thin soils, also evidence of other debris flows pre-harvest.
- Clearcutting creates instability, decreases tree root strength, increases soil saturation by increasing snow pack depth. Forest roads redirect surface and subsurface water.
- Management activities may have altered the timing of the landslides, but can't conclude that they increased the rate. All were in areas that already have landslides.
- Landslide sediment delivery: most landslides were confined to small tributaries, not larger-order channels.
- Fish habitat
 - Channel characteristics described.
 - Barriers to fish migration formed at some locations, but were passable at most locations.
 - Spawning gravel comparison:
 - No significant difference between managed and unmanaged areas.

- Sedimentation does not appear to be affecting spawning habitat.
- Rearing habitat:
 - Fewer pools: debris flows caused
 - Less LWD: past harvests without buffers.
 - Extra sedimentation creates channel braiding.
 - Standing timber would have minimized lateral spread of debris flow, then quicker habitat recovery.

Conclusions

- Future management activities on naturally unstable areas may increase the probability of initiating landslides during storm periods.
- Debris flows have had positive and negative effects. Magnitude of effect depends on length of time since last debris flow.

④ **Miller, R.D., 1975, Surficial geologic map of the Juneau urban area and vicinity, Alaska. U.S. Geological Survey, Miscellaneous Geologic Investigations Map I-885.**

<http://www.dggs.dnr.state.ak.us/pubs/pubs?reqtype=citation&ID=12956>

④ **Miller, R.D., 1973, Gastineau Channel Formation, a Composite Glaciomarine Deposit Near Juneau, Alaska: A description of the depositional environment and lithology of diamictons of late Pleistocene and early Holocene age. Geological Survey Bulletin 1394-C, United States Department of the Interior, pp. C1-C20.**

<http://www.dggs.dnr.state.ak.us/pubs/pubs?reqtype=citation&ID=3686>

④ **J. H. Patric and D. N. Swanston. 1968. Hydrology of Slide-Prone Glacial Till Soil in Southeast Alaska. Jour. of Forestry, January 1968.**

Compiler abstract. Authors attempted to create a soil mass movement through intensive irrigation of a Karta soil, discovered that soil pore water pressure at a local site is dependent on pore water pressure of surrounding soils.

④ **Patric J.H. and W.J. Walkotten. 1967. Elevation effects on rainfall near Hollis, Alaska. USDA For. Serv. Res. Note PNW-53. May 1967.**

Compiler abstract.

- Studied rainfall across an elevation gradient in the Maybeso valley near Hollis.
- For each inch of rain at sea level the average rainfall increase was 0.02 inches per hundred feet of elevation rise.

④ **Patric J.H. 1966. Rainfall Interception by Mature Coniferous Forests of Southeast Alaska. J. of Soil and Water Conservation. November-December Issue, 1966.**

Compiler abstract.

- Studied rainfall interception near Juneau Alaska.
- Interception loss of about 25 percent of annual rainfall must be accounted for in the forest water budget of southeast Alaska.

① Perkins, S.J. 1999. **Landslide inventory and sediment response study for monitored Sealaska streams. Report by Martin Environmental, Seattle, Washington to Sealaska Corporation, Juneau, Alaska. 27pp plus Appendices and maps.**

Author Abstract (Author Introduction): This report presents the results of a landslide inventory and sediment-response study of twelve streams that are the subject of ongoing studies of forest practices effectiveness by Sealaska and the Alaska Forest Association. The purpose of this was to 1) estimate relative sediment supply levels to the study streams, 2) determine the relative importance of landslides in supplying sediment to each stream, and 3) compile a history of sediment supply changes and historic channel responses to changes in bedload. The results of this study will provide the context for a second study phase: analysis of monitoring data to examine the effects of sediment supply changes on channel substrate and morphology.

The scope of this study consisted of inspection of aerial photographs, topographic maps, and supplemental information from timber harvest managers.

④ Saviers, Aimee. 2008. **Flooding and mass wasting along the Lynn Canal Corridor in Southeast Alaska – October 1998.** http://aprfc.arh.noaa.gov/pubs/newltr/pub6/SE_flood.html

④ Schroeder W.L. and D.N. Swanston. 1987. **Application of Geotechnical Data to Resource Planning in Southeast Alaska. USDA For. Ser. PNW Gen. Tech. Rep. PNW-198, January, 1987.**

Compiler abstract. Report discusses application of Geotechnical data and meteorological data to slope stability analysis and land management planning in southeast Alaska

④ Schroeder W.L. 1983. **Geotechnical properties of southeast Alaskan Forest Soils. Oregon State University, Civil Engineering Department. 1983.**

Compiler abstract.

- A wide variety of soil types exists in the Tongass National Forest. Generally the soils are fine-grained, but may be coarse grained with high fines content. Soil fines are generally silty in nature, although some clays exist. Soil densities may be quite low or reasonably high. In the field the soils' degree of saturation usually exceeds about 90 percent.
- Tongass soils have relatively high angles of internal friction. There is a modest (but important for slope stability) degree of cohesion available. Angle of internal friction is related to plasticity index.
- Water has an important influence on the behavior of these soils. Increasing saturation reduces undrained strength. Change in water level within a slope is a prime driving mechanism for slope instability.

④ Schroeder W.L. and G. Filz. 1981. **Engineering Properties of Southeast Alaskan Forest Soils. Oregon State University, civil Engineering Department.**

Compiler abstract.

- Due to high organic colloid content the plasticity of many soils in southeast Alaska decreases if the soils are dried before testing.
- The effective angle of internal friction of the soils studied tends to increase with increasing dry density and with decreasing plastic index.
- Specimens from a single site exhibited significant variability in their shearing behavior.
- Due to the variability, slope stability analysis based on a single set of strength parameters should be used with caution. In particular, the stability of thin soil on slopes is sensitive to small changes in cohesion.

④ Sidle R. C. 1984a. Shallow Groundwater Fluctuations in Unstable Hillslopes of Coastal Alaska. Zeitschrift Fur Gletscherkunde and Glazialgeologie Band 20 (1984) S. 79 -95.

Compiler abstract.

- Author measured groundwater in two hillslope hollows.
- Groundwater responds rapidly with very little lag to major rainfall inputs in confined hillslope depressions.
- Typically rates of groundwater rise were an order of magnitude higher than rainfall intensity. The rates were higher than could be predicted from vertical infiltration.
- Subsurface water is apparently channeled through discontinuous macropores and pipes within the hillslope soil mantle. Another possible explanation is the displacement of previously stored water upslope.
- Disruption of the system of macropores may lead to high pore water pressures antecedent to landslides.

④ Sidle R. C. 1984b. Relative Importance of Factors influencing Landsliding in Coastal Alaska.

Compiler abstract.

- Sensitivity analysis of the infinite slope model indicates that cohesion and soil depth are two most important variables influencing factor of safety for conditions typical of coastal Alaska. The influence of soil depth is greatly diminished on low cohesion soils.
- Slope gradient and angle of internal friction affected factor of safety by almost one order of magnitude less than did typical ranges of cohesion and soil depth.
- Groundwater exerts a dynamic influence on slope stability because water tables can develop in hillslope soils.
- Removal of vegetation can substantially reduce site stability through loss of root cohesion.
- The effects of groundwater fluctuations and loss of root strength would be the most important factors influencing the initiation of landslides.
- Caution should be exercised when the infinite slope model is used to quantitatively predict stability of natural slopes because of the inherent variabilities of soil and site factors.

④ Sidle, R.C. and D.N. Swanston. 1982. Analysis of a small debris slide in coastal Alaska. Canadian Geotechnical Journal Vol. 19 No. 2 pp 167-174. 1982.

Compiler abstract.

- A small slide occurred in a study area where piezometers were installed.
- The authors applied the infinite slope model to the available slope, soil and water table data.

- It must be remembered that the use of such models, based on theoretical soil mechanics, greatly oversimplifies the complex field situation. Rooting strength was assumed to be negligible.
- The authors note the evidence of recent soil creep days and months before the slide occurred.

④ Swanston, D.N. 2006a. **Assessment of landslide risk to the urban corridor along Mitkof Highway from planned logging of Mental Health Trust lands.** Unpubl. 19 pp.

④ Swanston, D.N. 2006b. **Critique of “Geotechnical forestry practices evaluation – Petersburg slope stability assessment, Petersburg, Alaska File Number 5342-004-00”.** August 30, 2006. 3 pp.

★ ④ Swanston, D. N. 1997. **Controlling Stability Characteristics of Steep Terrain with Discussion of Needed Standardization for Mass Movement Hazard indexing: A resource Assessment. In assessments of Wildlife Viability, Old-growth Timber Volume Estimates, Forested Wetlands, and Slope Stability. Conservation and Resource Assessments for the Tongass Land Management Plan Revision.** Charles G. Shaw III Technical Coordinator, Kent R. Julin Compiler. USDA For. Serv. PNW-GTR-392. March 1997.

Compiler abstract.

- Author reviews the stability factors and data for southeast Alaskan and defines four mass movement index ratings.
- A numeric mass movement index form is presented for forest-wide application.
- A critical slope angle of 72% is identified.

④ Swanston, D.N. 1995. **Overview of controlling stability characteristics of steep terrain in southeast Alaska with discussion of needed standardization for mass movement hazard indexing on the Tongass National Forest.** Unpubl.

① Swanston, D.N., and R. Erhardt. 1993. **Short-term influence of natural landslide-dams on the structure of low-gradient channels: An extended abstract. In: Proceedings of Watershed ‘91: A conference on the stewardship of soil, air, and water resources, 16-17 April 1991, ed. T. Brock.** USDA Forest Service, Alaska Region, R10-MB-217. Pages 34-38.

Author abstract: Landslides, one of the principal processes of sediment and large woody debris transport from uplands to anadromous fish streams in southeast Alaska, tend to enter low-gradient channels at nearly right angles. Rapid deceleration from impact of debris with the opposing bank, coupled with a substantial reduction in gradient, causes dewatering and deposition of a debris wedge at and immediately downstream from the point of entry of the landslide. The persistence of the wedge, both as a dam and temporary base-level for the channel, is largely determined by composition of material and the size of flows carried by the channel during storms. Subsequent flows over and around the deposit tend to be sediment poor and energy rich, resulting in more rapid downcutting, increases in downstream channel scour, and the frequent shifting of the channel bed for several hundred meters downstream. In this dynamic environment, the large woody debris piles downstream of the wedge serve as focal points for formation and persistence of habitat elements such as pools, riffles, and side channels. These habitat elements remain viable until occurrence of additional landslides or flood flows with power great enough to remobilize the debris.

★ ④ **Swanston D.N. and D.A. Marion 1991. Landslide Response to Timber Harvest in Southeast Alaska. Proceedings of the Fifth Federal Interagency Sedimentation Conference. March 18-21, 1991 Las Vegas Nevada.**

Compiler abstract.

The authors documented all landslides over 77 cubic meters in size on the Tongass national Forest from 1963 and 1983 aerial photos.

- The landslide occurrence rate in harvested areas is 3.5 times greater than in undisturbed areas.
- As a general rule, landslides in harvested areas are significantly smaller, occur at lower elevations, develop on gentler slope gradients, and tend to travel shorter distances.
- Under natural undisturbed conditions most failures are associated with shallow linear depressions. Only about 10% of slides occur in gullies.
- In contrast in harvested conditions about 30% of landslides occur in gullies. The number of landslides occurring at sites underlain by glacial till also is also substantially increased in harvested areas.
- Three quarters of all failure regardless of management initiate on slopes of 34 degrees or greater, that approximates a critical angle of stability for these hillslope soils.
- Eighty-six percent of failures occurred on warmer southerly aspects suggesting that aspect may substantially influence slope stability, possibly through its effect on hillslope water balance conditions.

★ ① **Swanston, D.N. 1974. The forest ecosystem of southeast Alaska. 5. Soil mass movement. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, General Technical Report PNW-17. 22pp.**

Author Abstract: Research in southeast Alaska has identified soil mass movement as the dominant erosion process, with debris avalanches and debris flows the most frequent events on characteristically steep, forested slopes. Periodically high soil water levels and steep slopes are controlling factors. Bedrock structure and the rooting characteristics of trees and other vegetation exert a strong influence on relative stability of individual sites.

Timber harvesting operations have a major impact on initiation and acceleration of these movements. The cutting of timber itself has been directly linked with accelerated mass movements, and the accumulation of debris linked with accelerated mass movements, and the accumulation of debris in gullies and canyons has been identified as a major contributor to the formation of large-scale debris flows or debris torrents. The limited road construction on steeper slopes thus far has had a relatively small impact.

Effective management practices on such terrain consist of identification and avoidance of the most unstable areas and careful control of forest harvesting operations in questionable zones.

② Swanston, D.N. 1970. Mechanics of debris avalanching in shallow till soils of southeast Alaska. USDA Pacific Northwest Forest and Range Exp. Station Res. Pap. PNW-103.

Compiler abstract: **A study of 3 logged areas with recent debris avalanches indicated that a combination of complete saturation, naturally unstable slopes (>34 degrees) and the loss of the anchoring effects of tree roots were the principal causes of the landslides.**

① **Swanston, D.N. 1969. Mass wasting in coastal Alaska. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Research Paper PNW-83. 15pp.**

Author abstract: Mass wasting, a dominant form of erosion in coastal Alaska, is common where slopes are oversteepened by glacial erosion, soils are newly developed and shallow, and there is abundant rainfall. Presently, the most practical policy for the forest-land manager is avoidance of susceptible areas during timber harvest. Old debris avalanche and flow scars are visible on aerial photos, but a more accurate identification of these areas can be made from a slope-gradient map, which can be used to (1) delineate potential slide areas, (2) determine percentage of slide-prone ground, and (3) establish cutting patterns causing minimum disturbance.

④ **Swanston, D. N. 1967a. Debris Avalanching in thin soils derived from bedrock. USDA For. Serv. Research Note PNW-64. September 1967.**

Compiler abstract.

- Destruction of the root system would greatly increase susceptibility of the slope soil to slides.
- Windthrow can be a triggering force.

④ **Swanston D.N. 1967b. Geology and slope Failure in the Maybeso Valley, Prince of Wales Island, Alaska. Douglas N. Swanston, Ph.D. Michigan State University, 1967.**

Compiler abstract. Rising pore water pressures in weathered till, frequently in excess of 124 pounds per cubic foot, is the most important factor in debris avalanche development.

④ **Swanston, D. N. 1967c. Soil-water Piezometry in a southeast Alaska Landslide Area. USDA Forest Service Research Note PNW-68. November 1967.**

Compiler abstract.

- A close relationship exists between rainfall and pore-water pressure development.
- Shear Strength of till soils decreases 65% at total saturation.
- The arrival of the first fall snows may terminate the season of maximum slide activity.

④ **Swanston D.N. and W.J. Walkotten. 1967. Progress report, The effectiveness of rooting as a factor of shear strength in the Karta soil. Study No. FS-PNW-1604:26 November 21, 1969.**

Compiler abstract.

- Hydraulic excavation of two Sitka spruce stumps showed extensive lateral root system with numerous sinker roots.
- Root decay is visible 5 years after clearcutting.

④ US Forest Service. 2008. **Soil and Water Forest-wide Standards and Guidelines. Tongass Forest Plan. January 2008. pp. 4-64 t- 4-66.**

④ Wu T.H., D.P. Bettadapura, and P.E. Beal. 1988. **A statistical model of root geometry. Forest Science, Vol. 34. No. 4, pp 980-997.**

Compiler abstract. Developed a model of root geometry based on measures at three sites in southeast Alaska and other sites across the US.

④ Wu T.H. and D.N. Swanston. 1980. **Risk of Landslides in Shallow Soils and its relation to clearcutting in southeast Alaska. Forest Sci. Vol 26. No. 3, 1980 PP 495-510.**

Compiler abstract.

- Modeled infiltration and seepage of water into a shallow soil over bedrock based on measurements taken with Piezometers in the Maybeso valley near Hollis Alaska.
- Piezometric rise and fall was rapid and directly related to rainfall.

④ Wu T.H., W.P McKinnell III, and D.N. Swanston. 1979. **Strength of tree roots and landslides on Prince of Wales Island, Alaska. Can. Geotech. J. Vol 16, 1979.**

Compiler abstract.

- Continued development of the pore-water and root strength model reported in 1976.
- Calculated safety factors based on the models and determined that loss of root strength following clear-cutting can seriously affect slope stability.

④ Wu, T.H. 1976. **Investigation of Landslides on Prince of Wales Island, Alaska. Geotechnical Engineering Report No. 5. Dept of Civil Engineering, Ohio State University, Columbus, Ohio.**

Compiler abstract.

- Field and laboratory investigations of pore-water pressure and infiltration and the influence of tree roots on shear strength and slope stability.
- Used piezometers at numerous field sites to model pieziometric rise in virgin forests and clearcut areas.
- Tree roots elongate under soil creep and can stretch as much as 3 inches before failure.

④ Yehle, L.A., 1978, **Reconnaissance Engineering Geology of the Petersburg Area, Southeastern Alaska, Petersburg Area, Southeastern Alaska, with Emphasis on Geologic Hazards. US Geological Survey, Open-File Report 78-675.**

<http://www.dggs.dnr.state.ak.us/pubs/pubs?reqtype=citation&ID=11205>

④ Yehle, L. A., 1974, **Reconnaissance Engineering Geology of Sitka and Vicinity, Alaska, with Emphasis on Evaluation of Earthquake and other Geologic Hazards. United States Department of the Interior Geological Survey, Open-file Report 74-53.**

<http://www.dggs.dnr.state.ak.us/pubs/pubs?reqtype=citation&ID=11000>

④ Yehle, L.A., and Lemke, R.W., 1972, **Reconnaissance engineering geology of the Skagway area, Alaska, with emphasis on evaluation of earthquake and other geologic hazards**, US Geological Survey, Open-File Report 72-454. 108 p., 4 sheets, scale 1:96,000.

<http://www.dggs.dnr.state.ak.us/pubs/pubs?reqtype=citation&ID=10971>

① Ziemer, R.R., and D.N. Swanston. 1977. **Root strength changes after logging in southeast Alaska**. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Research Note PNW-306. 10pp.

Author abstract: A crucial factor in the stability of steep forested slopes is the role of plant roots in maintaining the shear strength of soil mantles. Roots add strength to the soil by vertically anchoring through the soil mass into failures in the bedrock and by laterally tying the slope together across zones of weakness or instability. Once the covering vegetation is removed, these roots deteriorate and much of the soil strength is lost.

Measurements of change in strength of roots remaining in the soil after logging at Staney Creek on Prince of Wales Island, southeast Alaska, indicate that loss of strength in smaller roots occurs rapidly for all species the first 2 years. Western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) roots are more resistant to loss of strength than are Sitka spruce (*Picea sitchensis* (Bong.) Carr.) roots. By 10 years, even the largest roots have lost appreciable strength.



OTHER ALASKA REFERENCES

This section includes state-wide references and references in which the location of the study area was not identified.

① Everest, F.H., and R.D. Harr. 1982. **Silvicultural treatments. In: Influence of forest and rangeland management on anadromous fish habitat in Western North America**, ed., W.R. Meehan. USDA, Forest Service, Pacific Northwest Forest and Range Experiment Station, Corvallis, Oregon. General Technical Report PNW-134. Pages 1-18.

Electronic Abstract: Distribution of anadromous salmonids and coniferous forest coincides along much of the Pacific Slope; consequently, the habitat of anadromous fish is subject to a wide variety of silvicultural treatments required to establish and nurture young forests. The silvicultural activities include: cutting prescriptions to improve natural regeneration; preparing sites for planting; removing slash to reduce fire hazard; seeding and planting; reducing competition to enhance growth of young trees. Anadromous salmonids have exacting habitat requirements and most production in forested watersheds occurs in small (first-order to third order) streams. Some silvicultural treatments, such as broadcast burning and machine scarification and piling, can degrade water quality and fish habitat in small streams, but seldom do so because of the low spatial and temporal intensity of the activities. The highest risk of habitat damage from silvicultural activities occurs in areas with erosive soils and high annual

precipitation, or high summer solar radiation and low streamflow. Maximum risk from solar heating occurs in western and northeast Oregon, western and central Washington, northwest California, and central Idaho. High-risk areas for decreased water temperatures are located in northern and central Idaho, northeastern Oregon, southeastern Washington, northern British Columbia, and Alaska. Areas of central Idaho; northwest California; western Oregon, Washington, and British Columbia; and southeast Alaska are vulnerable to surface erosion and mass wasting.

① **Everest, F.H., and W.R. Meehan. 1981. Forest management and anadromous fish habitat productivity. In: Transactions of the Forty-Sixth North American Wildlife and Natural Resources Conference, ed., K. Sabol. Wildlife Management Institute, Washington, D.C. Pages 521–530.**

Electronic Abstract: The anadromous fishery resources of western North America are produced largely within forested watersheds. Forest and rangeland management activities that can influence the quality of anadromous fish habitat include timber harvest, road construction, and livestock grazing. Organic debris from forested watersheds of the Pacific Northwest and Alaska enters streams through direct litterfall, landslides, debris torrents, timber felling, and streambank erosion, plus blowdown of trees and branches. Large woody debris can create habitat for rearing salmonids, but may cause sedimentation in spawning areas. Large, naturally occurring debris can promote streambank stability and reduce streambed scour. Large accumulations of fine organic debris can adversely affect habitat by reducing dissolved oxygen and producing toxic leachates. Total removal of debris can result in a completely open channel, promoting streambed scour, streambank instability, and loss of fish habitat productivity. Debris torrents, a common mass erosion event in the Pacific Northwest, have a negative impact on habitat and production of anadromous salmonids in small streams immediately downstream from the torrent egress. Studies within a 1-mile reach of Knowles Creek, however, indicate that the total effect of debris torrents in that sediment-poor watershed tends to be positive. Preliminary results of a livestock grazing study do not show profound effects on fish populations among various grazing systems or between one to three years of season-long grazing and ungrazed controls.

④ **Mason, Owen, W.J. Neal, and O. H. Pilkey, with J. Bullock, T. Fathauer, D. Pilkey, and D. Swanston. 1997. Living with the coast of Alaska. Duke University Press. 348 pp.**

④ **State of Alaska. 2007. All-Hazard Risk Mitigation Plan – October 2007. Section 5.9 Ground Failure. Pp. 185-199.**



CANADA

★ ④ **Banner, A, P. LePage, J. Moran, and A. deGroot (editors). 2005. The HyP3 Project: pattern, process and productivity in hypermaritime forests of coastal British Columbia – a synthesis of 7-year results. B.C. Min. For., Res. Br., Victoria, B.C. Spec. Rep. 10.**

Author abstract:

- At the two study sites, the canopy intercepted 20 to 25% of the average annual rainfall (during the snow-free period).

- If areas are clearcut the amount of water that must be removed by the existing hydrological processes can be expected to increase.
- Possible consequences: a decrease in the time to peak flows after a storm, an increase in peak flow volumes, an increase in water table height, an increase in erosion as natural drainage pipes reach capacity sooner and more overland flow occurs.
- Soil pipes were identified at most study sites. Soil pipes contribute to stability in two ways. 1) by increasing the rate of soil drainage, and 2) by limiting development of perched groundwater conditions.
- If soil pipes become mechanically damaged and blocked, the increase in pore water pressure could trigger landslides.

④ Beaudry P.G. and R.M. Sagar. 1995. The water balance of a coastal cedar-hemlock ecosystem. Presented at the joint meeting of the Canadian Society for Hydrological Sciences and the Canadian Water Resources Association: Mountain Hydrology, Peaks and Valleys in Research and Applications, May 17 -19, 1995, Vancouver British Columbia, Canada.

① Bovis, M.J., and M. Jakob. 1999. The role of debris supply conditions in predicting debris flow activity. *Earth surface Processes and Landforms* 24: 1039-1054.

① Brardinoni, F., M.A. Hassan, and H.O. Slaymaker. 2002. Complex mass wasting response of drainage basins to forest management in coastal British Columbia. *Geomorphology* 49: 109-124.

① Clague, J.J., R.J.W. Turner, and A.V. Reyes. 2003. Record of recent river channel instability, Cheakamus Valley, British Columbia. *Geomorphology* 53: 317-332.

④ Chatwin, S.C., and R.B. Smith. 1992. Reducing soil erosion associated with forestry operations through integrated research: an example from coastal British Columbia. *In* Erosion, debris flows, and environment in mountain regions, proc. of the Chengdu Symp. IAHS Publ. no. 209

★ ④ Chatwin, S. C. 1994. Measures for Control and management of unstable terrain. Pp. 92-105 *in* A guide for management of landslide-prone terrain in the Pacific Northwest. 2nd ed. Land management handbook #18. B.C. Ministry of Forests

Author introduction. *A Guide for Management of Landslide-Prone Terrain in the Pacific Northwest* has been prepared for agency and industry personnel who are operating in areas with existing or potential stability problems. The document is intended for use in the coastal areas of the Pacific Northwest, even though the principles may be applicable to other locations in North America. The guide addresses four topics:

- Slope movement processes and characteristics.

- An office/field technique for recognizing landslide-prone terrain.
- Measures to manage unstable terrain during forestry activities.
- Road deactivation and revegetation of unstable terrain.

The region referred to as the Pacific Northwest extends from southern Alaska to northern California, and includes the province of British Columbia, and the states of Washington and Oregon. It is an area of high relief and varied bedrock comprised of several mountain systems fronting the Pacific Ocean.

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debris floods, and debris flows. These processes move water, sediment, and debris from the hillslopes of a watershed through channels to the fan. Fans in British Columbia are often the site of residential developments, and transportation and utility corridors, as well as high-value habitat for fish and high-productivity growing sites for forests. Collectively, these features are termed “elements-at-risk” because they may be vulnerable to watershed-generated hydrogeomorphic processes that issue into the fan. These processes may be natural or result from land use activities, and can cause the partial or total loss of some or all of the elements on the fan.

In British Columbia, forest harvesting and road building is associated with increased hydrogeomorphic hazards. The downstream effects of these forestry activities in source areas may be far-reaching and extend beyond the scope of conventional site-oriented planning. A five-step approach is presented to assist land managers undertake risk analyses and assessments that place their proposed developments within the watershed-fan system. The five steps are: 1) identify fans and delineate watersheds; 2) identify elements-at-risk on fans; 3) investigate fan processes; 4) investigate watershed processes; 5) analyze risks and develop plans. This scheme is applicable to watersheds throughout British Columbia.

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Author Abstract: Erosion and sedimentation are natural geomorphic processes characterized by large temporal and spatial variability. Recent radionuclide studies suggest that rare episodic events, such as large wildfires, produce massive sediment yields over time scales of thousands of years, thereby causing long-term average sediment production to exceed present-day average erosion rates by a factor of about 10. Even today, in undisturbed forested watersheds, sediment production is highly variable. Early studies of the effects of grazing and wildfire and surveys of river basins provided a foundation for much of the subsequent research on the effects of forest practices on erosion and sedimentation. The erosional and sedimentation effects of wildfire have been documented in many locations - ranging from none to minimal for low-intensity burns to catastrophic for high intensity burns. Management of forestlands to regulate the risk of wildfire effects on erosion and sedimentation is an important present-day concern throughout the region.

Research consistently has shown that roads have the greatest effect of all practices associated with forest management on both surface and mass erosion. A large body of research shows, however, that much of the erosional impact of roads is manageable through proper land-use planning, location, design, construction, maintenance, and road closure. Considerable empirical data exists to illustrate surface erosion rates on roads, including time trends following construction as well as the effectiveness of a variety of erosion control practices. Effects of harvesting and associated site preparation activities on surface erosion are generally minimal and usually are controlled by providing downslope buffers. An exception is broadcast burning on harsh sites with highly erodible soils. Mass erosion, usually in the form of debris avalanches and torrents, is managed through risk assessment that uses inventory data and/or slope stability models to identify high-hazard site conditions. The primary management option for minimizing mass erosion resulting from roads or timber cutting is avoiding high-risk sites. Where avoidance is not possible, special design features are used, in the case of roads, or cutting and site preparation practices are modified, in the case of timber harvesting.

Several empirical and process-based models have been developed to predict surface erosion rates, the effectiveness of a variety of erosion control practices, and downslope sediment delivery. Empirical data are the primary source of information for occurrence, magnitude, and downslope delivery of landslide material. Examples of downstream cumulative effects have been documented in terms of sediment delivery and associated channel responses. Methods to predict downstream cumulative effects are crude, however, limited primarily to sediment delivery, and are more applicable to smaller basins. Linkages between downstream cumulative effects and the impacts on beneficial uses, especially fish habitat, are poorly defined.

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This publication was released by the Alaska Department of Natural Resources to provide documentation for the review of the Alaska Forest Resources and Practices Act review of best management standard for mass wasting during 2007-2013. Seventy copies of the report were printed in Anchorage, AK at \$30.05 per copy.